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New Pressure on Distribution Costs Requires Closer Market Measurement



by
Herbert T. Hosking
and
Marcus Ainsworth

HOW efficient is passenger car distribution from the standpoint of market concentration? Here is a question which has been uppermost in the minds of sales managers, during the last few months, when a great deal of management effort has been devoted to the problem of reducing

Table 1

Marginal Sales of Passenger Cars

	Price Range†	Number of States* With No Sales			Number of States* With 1-5 Sales			Number of States* With 6 or More Sales		
		1930	1929	1928‡	1930	1929	1928	1930	1929	1928
Auburn	\$900-\$1,300	0	1	6	4	1	7	45	47	33
Buick	\$1,000-\$2,000	0	0	0	0	1	0	49	48	36
Cadillac	\$2,800-\$9,700	0	0	0	3	2	0	46	47	36
Chevrolet	\$500-\$700	0	0	0	0	0	0	49	49	36
Chrysler	\$900-\$3,600	0	0	0	0	0	0	49	49	36
De Soto	\$700-\$1,100	0	0	..	0	0	..	49	49	..
Dodge	\$800-\$1,200	0	0	0	0	0	0	49	49	46
Durant	\$700-\$1,000	0	0	2	0	0	6	49	49	38
Ford	\$400-\$600	0	0	0	0	0	0	49	49	46
Franklin	\$2,300-\$3,000	0	0	0	2	2	3	47	47	43
Hudson	\$900-\$1,500	0	0	0	0	0	0	49	49	46
Essex	\$600-\$800	0	0	0	0	0	0	49	49	46
Hupmobile	\$1,000-\$2,400	0	0	0	1	0	0	48	49	46
Lincoln	\$4,400-\$7,300	0	0	0	0	3	4	49	46	42
Marmon-Roosevelt	\$1,000-\$5,100	0	0	1	0	1	7	49	48	38
Nash	\$800-\$2,000	0	0	0	0	0	0	49	49	46
Oakland	\$900-\$1,100	0	0	0	0	0	0	49	49	46
Pontiac	\$700-\$800	0	0	0	0	0	0	49	49	46
Oldsmobile	\$800-\$1,000	0	0	0	0	0	0	49	49	46
Packard	\$2,400-\$4,300	0	0	0	0	0	0	49	49	46
Graham-Paige	\$800-\$2,100	0	0	0	0	0	0	49	49	46
Peerless	\$1,500-\$3,100	10	7	2	8	6	10	31	36	34
Pierce-Arrow	\$2,700-\$6,400	2	1	1	4	7	7	43	41	38
Plymouth	\$500-\$700	0	0	..	0	0	..	49	49	..
Reo	\$1,700-\$2,700	0	0	1	1	0	1	48	49	44
Studebaker	\$800-\$2,600	0	0	0	0	0	0	49	49	46
Whippet .....	..	0	0	..	0	0	..	49	49	..
Willys-Knight	\$1,100-\$1,200	0	0	0	0	0	0	49	49	46

* Includes Dist. of Columbia.

† List price F.O.B. factory (approximate) January, 1931.

‡ 3 states missing.

the costs of distribution, along with manufacturing and non-productive costs.

It has long been assumed by the general public, particularly those persons living in thickly populated districts, that all automobile companies enjoyed a completely national distribution, and that while the proportion of a single make of car in different sections of the country might vary slightly, it would generally represent, approximately, the proper share of that brand in the local market.

Any residual illusions of this nature will be dispelled by reference to Table 2, which appears herewith. In the table, which is based on passenger car sales by makes and states in 1930, the proportion of national all-make sales for the year accruing to each state is calculated, and against this is shown what proportion of its own total sales for the year each make had in a given state.

P. C. Gartley, Western sales manager of Willys-Overland, Inc., recently made the statement that although there are 3063 counties in the United States, that 170 of these, the city-county markets, absorb 48 per cent of all passenger automobiles sold.

Such concentration naturally exerts a strong influence upon the choice of media for advertising. It also

Table 2

Percentage Analysis of Passenger Car

1930	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Dist. of Col.	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri
Per cent of total U.S. Population.....	2.1	0.4	1.5	4.6	0.8	1.3	0.2	0.4	1.2	2.4	0.4	6.2	2.6	2.0	1.5	2.1	1.7	0.7	1.3	3.5	3.9	2.1	1.6	2.9
Per cent of total U.S. Pass. Car Sales....	.97	.34	.74	7.03	1.0	1.57	.28	.75	1.21	1.05	.39	6.22	2.67	2.93	1.71	1.32	1.01	.68	1.40	3.97	5.27	2.54	.78	3.29
Auburn.....	0.2	0.1	0.2	8.0	0.6	2.6	0.3	0.9	0.8	0.4	0.1	8.9	3.3	1.7	0.3	0.9	0.4	0.2	0.8	4.4	2.1	0.9	0.0	2.1
Buick.....	0.8	0.4	0.3	8.2	1.0	2.2	0.4	0.8	1.0	0.8	0.3	6.5	1.9	1.5	1.3	0.6	0.6	0.8	1.4	4.8	5.0	1.5	0.5	2.3
Cadillac.....	0.4	0.1	0.4	12.2	0.4	3.3	0.6	0.9	1.0	0.6	0.0	7.2	1.5	0.8	0.5	0.4	0.4	0.8	0.9	5.7	7.1	0.9	0.1	1.9
Chevrolet.....	1.3	0.3	0.9	5.7	1.1	1.2	0.3	0.6	1.4	1.3	0.5	5.7	2.6	4.0	2.2	1.6	1.2	0.6	1.7	2.8	4.5	2.9	1.2	4.0
Chrysler.....	0.9	0.2	0.7	7.6	0.8	2.2	0.4	0.6	1.1	0.6	0.3	6.6	2.1	1.9	1.0	1.3	0.8	0.8	1.3	4.3	3.0	2.4	0.7	2.0
De Soto.....	0.7	0.5	0.6	11.0	0.7	3.1	0.1	0.5	0.7	0.6	0.5	7.9	3.7	1.0	1.2	1.1	1.1	0.7	0.7	2.7	3.7	1.3	0.6	2.1
Dodge.....	0.8	0.4	0.9	7.8	1.2	2.4	0.1	0.5	0.7	0.8	0.5	6.5	2.8	2.9	1.8	1.4	1.3	0.8	0.9	5.1	3.6	1.6	0.5	2.9
Durant.....	0.1	0.5	0.5	16.3	2.3	0.9	0.6	0.6	0.4	0.5	1.0	4.1	1.7	3.7	1.0	1.1	0.2	0.8	1.1	2.6	3.7	2.4	0.2	3.3
Ford.....	1.1	0.3	0.9	7.4	1.0	1.2	0.3	0.9	1.4	1.3	0.4	6.0	2.7	2.9	1.7	1.4	1.1	0.5	1.3	3.9	6.5	2.6	0.9	3.3
Franklin.....	0.1	0.2	0.1	8.7	0.5	3.3	0.3	0.7	1.2	1.0	0.1	8.9	1.1	0.5	0.3	0.8	0.9	0.7	1.4	6.9	1.8	0.3	0.0	2.0
Hudson.....	0.6	0.3	0.2	7.2	1.0	2.5	0.3	0.6	1.3	0.6	0.3	6.0	3.2	2.3	2.0	0.9	0.6	1.2	1.2	6.2	7.0	1.9	0.2	2.0
Essex.....	0.6	0.2	0.3	5.1	0.9	2.6	0.3	0.7	1.1	0.3	0.3	5.9	3.3	2.2	1.6	1.4	0.5	1.8	1.5	7.8	6.6	1.8	0.2	3.0
Hupmobile.....	0.8	0.5	0.2	7.0	0.9	2.7	0.2	1.0	0.8	0.9	0.1	8.2	2.0	1.8	0.9	1.1	0.8	0.6	1.5	5.4	3.7	2.3	0.4	2.9
Lincoln.....	0.6	0.2	0.4	10.0	0.5	1.7	0.3	1.1	1.1	0.8	0.1	11.8	1.8	1.5	0.7	0.9	0.6	0.5	0.9	4.9	4.3	1.3	0.4	2.3
Marmon.....	0.7	0.4	0.2	5.7	1.5	2.1	0.1	0.6	1.2	0.6	0.1	6.9	6.1	2.0	1.0	1.4	0.8	0.6	0.7	4.9	4.2	1.4	0.3	2.9
Nash.....	0.3	0.5	0.4	7.8	1.2	2.1	0.2	0.6	0.7	0.4	0.3	7.1	1.9	2.0	1.3	0.6	1.4	1.1	1.2	6.1	2.3	1.8	0.8	2.6
Oakland.....	0.2	0.3	0.3	7.1	0.9	2.8	0.4	1.0	0.9	0.4	0.3	6.6	2.5	1.8	1.5	0.8	0.7	1.0	1.5	3.8	5.2	2.5	0.1	3.0
Pontiac.....	0.4	0.2	0.4	5.1	0.9	2.1	0.4	0.9	0.9	0.5	0.3	7.0	3.4	3.1	2.1	1.0	0.9	1.1	1.7	4.6	5.0	3.1	0.3	3.4
Oldsmobile.....	0.4	0.4	0.2	4.7	0.7	1.5	0.2	1.0	0.5	0.7	0.2	7.8	3.7	2.9	1.1	0.6	0.5	0.8	1.2	3.9	6.8	2.1	0.2	3.8
Packard.....	0.4	0.2	0.1	8.9	0.6	3.1	0.5	1.3	0.8	0.5	0.0	8.6	1.5	1.0	0.4	0.6	0.5	0.7	1.3	6.9	4.4	1.9	0.1	2.0
Graham.....	0.8	0.4	0.5	9.0	1.4	2.4	0.0	1.0	1.8	0.8	0.4	6.5	2.4	2.0	0.9	0.8	0.7	0.5	1.6	3.7	4.6	2.7	0.3	3.5
Peerless.....	0.0	0.5	0.0	5.5	0.3	1.6	0.0	0.5	0.1	0.0	0.0	9.6	1.6	0.6	1.3	0.5	0.6	0.9	1.7	7.2	1.8	0.6	0.0	2.2
Pierce-Arrow.....	0.2	0.1	0.3	8.6	0.8	3.2	0.2	1.0	0.7	0.5	0.0	6.0	1.0	0.5	0.5	0.5	0.4	0.5	1.4	8.7	1.6	1.4	0.1	3.5
Plymouth.....	1.1	0.3	0.9	3.6	1.0	1.3	0.2	0.6	0.9	0.6	0.4	6.1	3.1	3.5	1.7	1.9	0.7	1.2	1.2	3.2	4.9	4.1	0.3	3.1
Reo.....	0.5	0.0	0.2	8.6	0.6	3.7	0.0	0.6	1.2	0.4	0.3	5.6	1.6	1.5	1.1	1.4	0.3	0.8	1.3	6.6	7.7	1.7	0.3	2.0
Studebaker.....	0.7	0.7	0.2	11.8	0.8	2.2	0.2	0.7	0.4	0.8	0.3	7.9	3.1	1.9	1.1	0.9	0.6	0.9	1.4	4.8	3.3	2.3	0.4	1.9
Whippet.....	1.1	0.3	0.4	3.8	1.5	0.8	0.3	0.3	0.8	0.4	0.5	5.0	3.4	4.7	2.3	2.1	0.4	0.6	1.3	2.1	3.2	4.3	0.5	6.8
Willys-Knight.....	0.3	0.4	0.2	9.7	1.2	1.7	0.1	0.7	0.5	0.3	0.1	6.3	1.3	1.7	1.3	1.0	0.6	0.9	1.0	5.8	1.9	2.1	0.2	2.7

has a fundamental, although perhaps not so well-charted, effect upon the costs of getting passenger cars to the consumer.

It is natural to suppose that the largest automobile producers will be found to have the widest distribution of sales, and that in a given area their sales will most closely approximate the "normal" percentage for the district; which is to say that if 10 per cent of all the automobile sales in the U. S. are made in that district, that something approaching 10 per cent of the individual large producer's sales will be made in that district.

The smaller producer can most economically cultivate a relatively limited market. Some companies, as may be seen from reference to Table 1, have attained a remarkable degree of success in making the bulk of their sales in a limited area. Auburn, for example, got about 50 per cent of its sales in four states: New York, with a concentration of 25 per cent, New Jersey, Illinois and California.

Cadillac, Franklin and Pierce-Arrow show a similar concentration in the New York area, while Ford and Chevrolet are both below the figure representing their "normal" share of the New York market.

An exhaustive descriptive analysis of Table 2 would

serve no purpose here. The table is in such form that it may handily be used for reference and comparison. It is believed that when the passenger car registration figures become available for the complete first half of this year, that a table based on them, and constructed along similar lines, would furnish an extremely interesting commentary on the shifting of distribution effort to meet the demands of a generally abbreviated market.

Another aspect of the passenger car distribution problem, one which is rapidly losing the importance it had in the years previous to 1926, is illustrated on Fig. 1, which appears on the first page of this article. This is the problem of marginal distribution, which may be defined as sales in territories where the return is so small that no factory-organized sales effort is expended upon them.

In 1930, as will be seen from Fig. 1, only two passenger car producers did not sell in every state of the United States. In 1929, the number of companies was three. In 1926, it was six. In the years previous to 1926, when the number of competing companies was considerably larger, the number of companies which fell short of obtaining national distribution was proportionately larger. This is indicated by reference

Sales by States and Makes During 1930

Table 2

Montana	Nebraska	Nevada	N. Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin	Wyoming	1930
0.4	1.1	0.1	0.4	3.3	0.4	10.2	2.6	0.6	5.4	2.0	0.8	7.9	0.6	1.4	0.6	2.1	4.7	0.4	0.3	2.0	1.3	1.4	2.4	0.2	Per cent of total U.S. Population
.44	1.58	.13	.41	3.73	.27	10.15	1.29	.49	6.03	2.01	.83	7.59	.60	.71	.70	1.44	4.57	.39	.34	1.70	1.45	1.08	2.75	.18	Per cent of total U.S. Pass. Car Sales
0.3	0.5	0.3	0.5	7.5	0.1	25.5	0.2	0.0	7.4	0.6	0.4	8.5	0.9	0.0	0.2	0.5	1.1	0.6	0.3	0.6	1.6	0.6	1.6	0.0	Auburn
0.3	1.0	0.2	0.5	5.7	0.4	16.3	0.9	0.2	4.4	2.0	0.8	8.9	0.8	0.4	0.3	1.0	4.3	0.3	0.4	1.1	1.7	0.5	2.5	0.2	Buick
0.1	0.3	0.1	0.4	6.8	0.1	21.1	0.6	0.0	5.6	1.1	0.3	7.7	0.8	0.1	0.0	0.7	2.3	0.2	0.2	0.5	0.7	0.4	1.7	0.1	Cadillac
0.5	2.1	0.1	0.4	2.9	0.4	7.6	1.5	0.6	5.5	2.9	0.8	6.3	0.5	1.0	0.9	1.8	6.2	0.4	0.3	2.2	1.2	1.2	2.9	0.2	Chevrolet
0.4	1.2	0.3	0.5	5.2	0.2	14.1	1.4	0.4	5.2	1.2	0.7	11.6	1.0	0.5	0.6	1.0	3.3	0.3	0.5	1.5	1.7	1.0	2.4	0.2	Chrysler
0.5	0.6	0.3	0.5	3.5	0.3	10.8	0.8	0.3	7.3	1.2	0.9	9.9	1.5	0.6	0.3	0.9	5.3	0.5	0.3	1.4	2.2	1.0	2.2	0.1	De Soto
0.5	1.6	0.3	0.3	3.7	0.3	9.1	1.4	0.3	5.3	2.8	0.8	9.0	0.8	0.4	0.8	1.5	4.5	0.5	0.4	1.6	1.3	1.6	2.7	0.3	Dodge
0.7	1.1	0.3	0.5	3.5	0.3	7.4	0.4	0.7	5.6	1.1	3.1	8.5	0.4	0.1	1.4	0.6	3.4	1.4	0.3	1.1	4.6	0.8	3.0	0.1	Durant
0.4	1.6	0.1	0.4	3.3	0.3	8.7	1.6	0.5	6.0	2.1	0.9	6.8	0.5	0.9	0.7	1.6	4.9	0.4	0.3	1.8	1.5	1.0	2.5	0.2	Ford
0.6	0.3	0.1	0.6	5.4	0.0	20.2	0.6	0.1	8.1	1.2	1.1	10.0	0.9	0.2	0.2	0.7	2.4	0.4	0.3	0.8	1.5	0.8	1.6	0.1	Franklin
0.5	0.5	0.3	0.5	5.2	0.1	13.1	1.2	0.2	6.7	0.8	0.8	9.2	0.7	0.5	0.4	0.7	1.5	0.4	0.5	1.1	1.4	0.9	3.0	0.2	Hudson
0.4	0.8	0.2	0.6	4.5	0.1	12.5	1.0	0.3	7.2	0.7	0.8	8.9	0.7	0.4	0.3	0.9	1.5	0.5	0.6	1.4	1.5	1.2	2.8	0.2	Essex
0.4	1.0	0.1	0.4	5.5	0.0	14.1	0.3	0.1	6.4	0.9	0.7	10.7	0.7	0.4	0.7	1.4	2.2	0.3	0.4	1.6	2.3	0.7	1.8	0.2	Hupmobile
0.1	0.9	0.1	0.3	4.0	0.1	22.4	0.9	0.0	5.3	1.1	0.9	6.8	0.8	0.2	0.1	1.0	2.8	0.2	0.2	0.8	0.7	0.5	1.1	0.0	Lincoln
0.8	0.7	0.1	0.6	4.7	0.2	14.8	0.5	0.7	8.1	0.7	0.8	9.8	0.2	0.4	0.4	0.6	3.2	0.3	0.2	1.2	0.9	1.7	1.9	0.1	Marmon
0.5	0.8	0.1	0.7	6.4	0.2	16.7	0.5	0.5	5.3	1.0	0.6	9.2	0.7	0.3	0.5	0.6	2.2	0.4	0.5	0.8	1.0	1.0	4.6	0.2	Nash
0.5	0.7	0.0	0.4	5.4	0.2	13.1	0.6	0.4	7.3	1.5	0.8	9.9	0.6	0.3	0.5	0.6	2.6	0.3	0.5	1.5	1.3	1.4	3.8	0.1	Oakland
0.4	1.3	0.0	0.4	3.5	0.2	10.1	1.0	0.6	7.6	2.1	0.8	7.7	0.8	0.4	0.6	0.9	3.6	0.3	0.4	2.0	1.2	1.2	4.0	0.1	Pontiac
0.3	1.4	0.1	0.5	5.4	0.1	14.2	0.5	0.4	7.8	1.0	0.7	9.4	0.6	0.3	1.4	0.8	1.9	0.3	0.3	0.7	1.6	0.9	3.3	0.2	Oldsmobile
0.0	0.4	0.1	0.3	7.1	0.1	18.9	0.5	0.0	5.8	1.1	0.5	10.5	0.8	0.3	0.2	0.8	1.9	0.3	0.4	0.8	0.8	0.6	1.5	0.0	Packard
0.3	0.9	0.1	0.4	4.0	0.1	12.0	0.8	0.3	6.2	1.0	1.3	10.5	0.6	0.2	0.4	1.2	2.9	0.6	0.5	1.2	1.3	1.5	2.9	0.1	Graham
0.1	0.3	0.0	0.3	7.6	0.0	13.0	0.1	0.0	17.1	0.2	0.0	11.8	1.7	0.0	0.0	0.1	1.2	0.0	0.5	1.4	0.8	0.3	1.9	0.0	Peerless
0.2	0.1	0.0	0.4	8.6	0.0	21.2	0.3	0.0	4.5	1.6	0.4	10.4	1.6	0.0	0.1	1.4	3.3	0.1	0.2	0.9	0.5	0.4	2.1	0.0	Pierce-Arrow
0.6	2.2	0.2	0.5	2.5	0.2	9.1	1.1	0.6	7.5	1.5	0.7	11.3	0.6	0.5	1.0	1.1	3.8	0.2	0.6	1.4	1.8	1.4	3.5	0.2	Plymouth
0.5	0.5	0.0	1.1	4.3	0.0	12.6	0.2	0.2	6.1	1.2	1.2	8.4	2.3	0.4	0.4	0.6	5.1	0.3	0.4	1.0	1.7	1.4	2.0	0.1	Reo
0.4	1.4	0.2	0.4	5.2	0.1	14.2	0.4	0.4	5.4	0.8	0.9	8.0	0.6	0.3	0.6	1.3	3.1	0.3	0.2	0.8	1.7	0.7	3.1	0.1	Studebaker
0.9	3.0	0.1	0.3	2.0	0.3	8.3	1.1	1.3	8.5	3.0	0.4	6.3	0.3	0.3	1.5	1.9	3.8	0.2	0.8	1.6	1.6	2.0	3.4	0.2	Whippet
0.5	1.3	0.1	0.4	6.6	0.2	17.7	0.3	0.4	8.5	0.8	1.0	8.8	1.2	0.0	0.3	0.7	2.4	0.1	0.4	1.0	2.4	1.1	1.7	0.1	Willys-Knight

to older issues of *Automotive Industries*, although, unfortunately, no compilation of this sort which would indicate the specific companies involved is available.

In 1930, the record shows, there were seven producers of passenger cars who sold five units or less, in from one to eight states. In 1929, and in 1926, this number of manufacturers was eight, and the number of states where this situation existed, was also larger.

With the general trend toward a decrease in the number of companies producing passenger cars, distribution of them is becoming more perfect, in the sense that it is reaching a wider area throughout the country.

It is still apparent, however, that an improvement in the circulation coverage in the national media which carry the bulk of consumer advertising placed by passenger car producers would be able to improve the quality of "secondary sales," those which may be directly attributed to the appeal of national advertising copy.

Taking together Tables 1 and 2 a pretty fair composite idea of the nature of passenger car distribution in the United States may be obtained. It is indicated that the companies which have obtained the nearest approximation to normal distribution in the greatest

number of states are those companies which are large enough to decentralize their manufacturing and sales activities through branch assembly plants and regional sales activities. Other companies, not in this class have, however, been able to build a uniformly strong dealer organization by the constructive use of trade journal advertising and direct-mail campaigns. The danger of too much sales concentration in a limited territorial area is fairly obvious. Usually such a sales organization is centered around a single distributorship or factory branch. In the case of the distributorship, a change of representation may seriously hamper the sales activities of the first factory concerned, and a second distributorship of a caliber to continue the work of the first may not easily be found. In the case of a factory branch organization, the question is one of management, which, naturally, is not of a uniformly excellent character.

Concentration of sales close to the producing plant is probably desirable from the standpoint of distribution economy, but concentration of sales in several areas in territory not contiguous to that of the producer is far more likely to indicate that effective sales methods of a lasting character are being used in the industry.

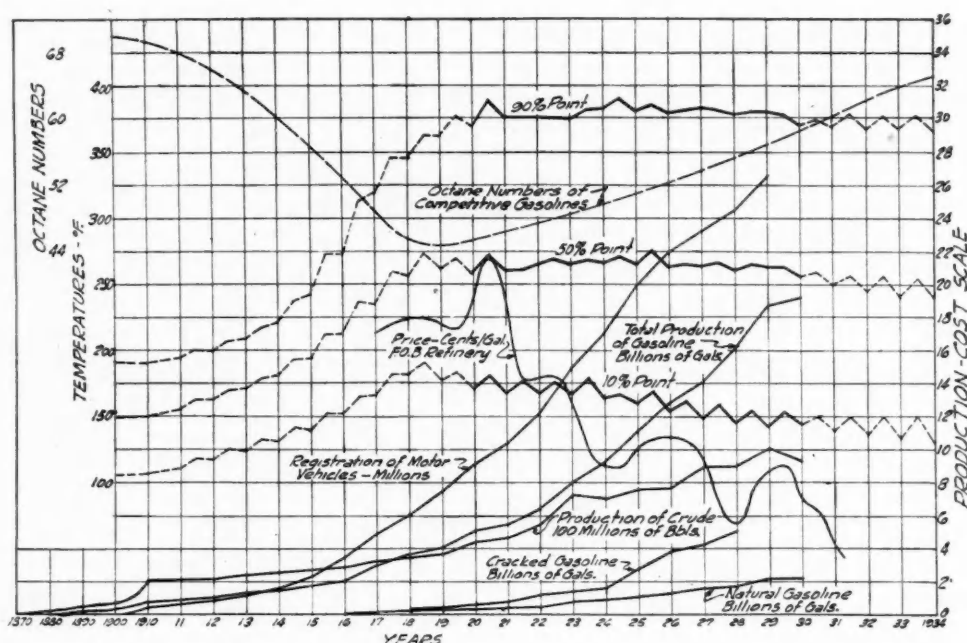


Fig. 1—Chart indicates trend in motor fuel is toward higher knock rating + + +

by
George
Granger
Brown *

Improved Knock Rating and Are Properties of Latest Premium

Steady improvement in standard priced gasolines has tended to decrease the advantage of a premium fuel with only an anti-knock feature + + + + +

THE developments in motor fuel characteristics are the results of the composite effect of many factors and economic forces.

At the present time the industry is apparently in the midst of changing its marketing program from the following three grades of motor fuel:

- 1—the standard of competitive motor fuel;
- 2—a premium fuel based on high knock rating;
- 3—a premium "high-test" fuel based on high volatility similar to aviation gasoline—

to the marketing of three other grades of motor fuels as follows:

- 1—a sub-grade approximately 3c below the standard competitive product;
- 2—the standard competitive grade of motor fuel;
- 3—a premium gasoline of high knock rating and high effective volatility, particularly adapted to the motor car rather than aviation service.

The premium high volatile aviation fuel should be eliminated as a separate grade because such a gasoline is no longer necessary nor even desirable. The improved volatility in the first 50 per cent of the

standard or competitive priced motor fuel, and the improvement in the newer carbureting systems mean that reasonably satisfactory performance can be obtained even in cold weather with many of the standard priced motor fuels. This fact combined with the poor acceleration obtained on warm motors with aviation type gasoline has caused a rapid decrease in the demand for the premium "high-test" gasoline.

Steady improvement in the knock rating of the standard priced gasoline has also tended to decrease the relative advantage in the premium anti-knock gasoline. The logical move is, therefore, to combine improved knock-rating and volatility in a single premium motor fuel. This is now being done.

The relatively large quantity of distress gasoline forced on the market by the over-production in the last few years has developed a demand and a market for a low price gasoline of lower anti-knock value than that usually marketed at the standard price. In many localities this market has been supplied entirely by cut-rate stations. The regular distributors are now recognizing this market and are prepared to supply it with a cut-rate gasoline at approximately 3c less than the standard price.

*Paper presented at the annual convention of the Natural Gasoline Association of America recently. Abbreviated.

In many ways this low sub-standard motor fuel offers a solution to some of the problems in the industry, particularly in providing an outlet for those gasolines of such high knocking tendencies that they cannot be sold in competition with the other competitive gasoline and cannot be brought up to Ethyl standard with use of the maximum amount of Ethyl fluid allowed by law. On the other hand the widespread marketing of a motor fuel at 3c below the recognized competitive price will tend to still further decrease the net income of the refiner. This is obvious when it is considered that the first result of such a program is to lower the average selling price of motor fuel without increasing the quantity sold.

The various factors that control motor fuel quality are:

Economic forces, essentially supply and demand.

Technical forces, or reliable data concerning those qualities desired in motor fuel.

Commercial forces, evident in the specifications under which motor fuel is purchased or sold.

Without doubt, the most important economic factor is the relationship between supply and demand. The effect of this fundamental economic principle upon the

price of gasoline has long been recognized, but it has also exerted a very important influence upon the quality characteristics of motor fuel.

Accurate knowledge concerning the desirable qualities in motor fuel has been almost entirely lacking until the last few years, but is now readily available and is becoming of major importance in determining specifications and motor fuel quality.

The third important factor in considering motor fuel developments is that of specifications which may be written by consumers, producers, or licensing organizations such as the Ethyl Gasoline Corporation. Specifications are essentially the detailed expression of other forces, economic, technical, and political, but must be considered separately because of their direct importance in determining motor fuel quality.

In Fig. 1 are shown the total registration of motor vehicles at the end of each year since 1900, compared with the total production of gasoline and the total production of crude oil. The production of gasoline by cracking, and the production of natural gasoline are also included to show what effect these developments might have. For purposes of comparison, the prices f.o.b refinery of gasoline and of natural gasoline are also included.

The volatility of the motor fuel sold is indicated by the approximate average ten per cent point and 50 per cent and 90 per cent points on the A.S.T.M. distillation as indicated in Fig. 1. In an attempt to approximate the knock rating of the motor fuel, the octane number of the average motor fuel was estimated largely from volatility characteristics and also plotted in Fig. 1.

Fig. 2 shows the approximate A.S.T.M. distillation of the gasoline sold in the years as indicated. In the latter years these data are taken from the Bureau of Mines' surveys, and represent summer gasoline.

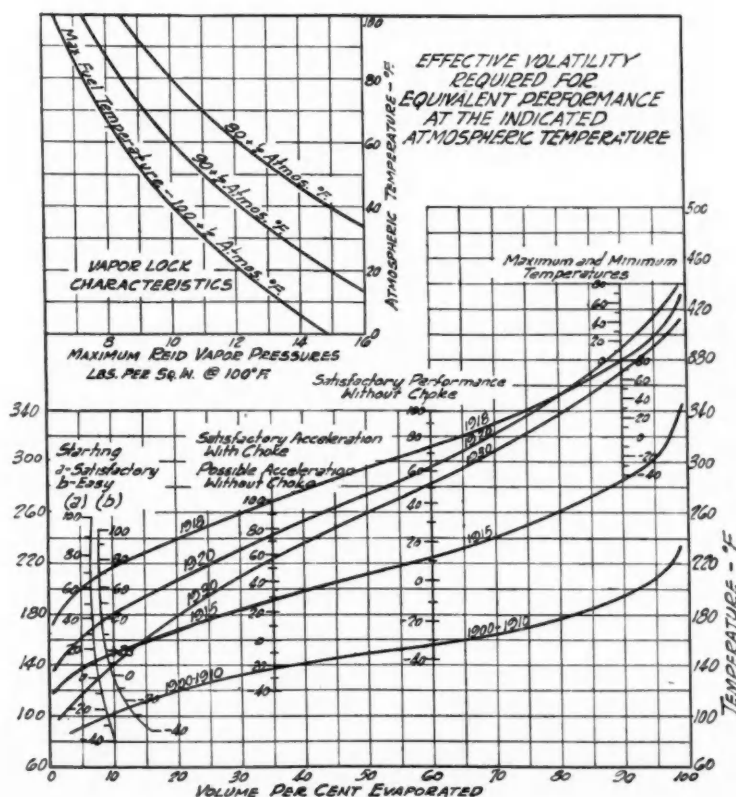
[At this point in his paper, Mr. Brown gave a discussion of the historical development of motor gasolines from 1900 on, under the heads, Economic Forces 1900-1918, Specifications, and Increasing Effect of Scientific Knowledge, and following this he discussed present tendencies under the headings of Volatility and Knock Rating. This part of the paper is here omitted.—EDITOR.]

About a year ago the American Society for Testing Materials organized Technical Committee A as a Sub-Committee of D-2 on petroleum products and lubricants. Technical Committee A on gasoline has as its principal function the study of the relation between test data and service performance of gasoline and to prepare and recommend material specifications. Because the recommendations of this committee would be based upon scientific test data carefully studied and interpreted by committees of consumers and producers, it is expected that these commercial specifications will be most valuable and satisfactory and will be recognized as a commercial definition of gasoline. At the present time, Technical Committee A has three sub-committees, I, on gum; II, on corrosion; III, on vapor lock problems.

None of these sub-committees have yet recommended specifications, but the committee on gum and the committee on vapor lock are making satisfactory progress and appear to have no serious difficulty in obtaining the necessary test and performance data. The committee

Volatility Gasolines

Fig. 2—More adequate change in first 50 per cent of distillation curve to compensate for changes in atmospheric pressures is expected + + + + +



on corrosion is finding it difficult to obtain the necessary data on which to base its recommendations.

This committee will probably prepare a general all-inclusive specification for gasoline which will include all motor fuel considered satisfactory from an operating standpoint. For this reason we may expect the recommendations from Technical Committee A to be somewhat similar to the present specifications for U. S. motor gasoline, since this is a similar specification including all fuels considered satisfactory for motor car operation. It is also probable that this committee will recognize the importance of changes in volatility to meet changes in atmospheric temperature.

The present automobile represents about the same susceptibility to gum as those cars that will be produced in the future. For this reason the gum limits to be recommended may stand for some time. In the case of vapor lock, however, there is considerable room for improvement in the design of the fuel systems and the committee will probably find it possible to revise its vapor pressure recommendations upward as improved cars are produced.

The Place of Natural Gasoline in Motor Fuel

With the steady increase in knock rating of competitive motor fuels, the knock rating of natural gasoline will not long remain noticeably superior to the ordinary motor fuel. This means that improved knock rating will not be an important selling point for use of natural gasoline. Although knock ratings of competitive motor fuel may run from 70 to 78 octane number, it is doubtful if competitive motor fuel will exceed an average knock rating of about 65 octane number for some time. This is approximately the knock rating of a Mid-continent natural gasoline containing about 15 per cent of butane, which should make an excellent blending stock for improvement in volatility.

For this reason it seems that the place of natural gasoline in motor fuel is entirely that of lowering the front end of the distillation curve, thereby improving the effective volatility of the finished product. The vapor pressure of such a natural gasoline should be in the neighborhood of 15 to 20 lb. per sq. in. so that it could be blended in relatively large quantities, 30 to 50 per cent, to produce a fuel of easy starting and excellent acceleration characteristics.

Blending for Knock Rating

In blending natural gasoline it is usually possible to estimate the knock rating of the final blend by simply taking the weighted average of the knock rating expressed in octane of the natural gasoline and of the blending stock. For example, if the natural gasoline shows a knock rating of 65, and the blending stock a knock rating of 55, and the blend is to be composed of 20 per cent natural and 80 per cent of blending stock, the resulting blend will have a knock rating of $0.2 \times 65 + 0.8 \times 55$ or 57. The error is usually on the safe side, in that the knock rating of the final blend may be somewhat higher. Where the differences in knock rating are rather large this method is less satisfactory.

Blending for Volatility

Blending to produce volatility is based upon A.S.T.M. distillation characteristics which may be determined with sufficient accuracy in the manner given by Alden and Blair* or other similar methods already available.

*National Petroleum News, Nov. 12, 1930, p. 107.

When blending natural gasoline it is necessary to limit the vapor-pressure of the final blend in order to insure reasonable freedom from difficulty due to vapor lock. The relationship between the vapor pressure of the final blend, that of the blending stock and of the natural gasoline and the per cent of natural gasoline in the blend, is also given by Alden and Blair.

Effect of Blending on Gum

Natural gasoline is almost entirely free from gum and decreases the gum in the final blend in two ways:

1. By diluting the blending stock with a material containing less gum and
2. By making the blend more volatile so that it will vaporize more rapidly, thereby forming less gum to be deposited.

Summary

The present trend in motor fuel is towards a somewhat higher knock rating, probably about 75 octane number as a limit in competitive gasolines or an average of about 65 to possibly 70 octane number, and towards a fuel of greater effective volatility as indicated by a low front end in the distillation curve, particularly for cold weather gasoline. Perhaps the most important development in volatility will be a more adequate change in the first 50 per cent of the distillation curve to compensate for changes in atmospheric temperature. The proper extent of this change for the representative motor car now in service is indicated in Fig. 2, and the probable developments for the immediate future have been indicated in Fig. 1.

The place of natural gasoline in motor fuel is primarily to improve the effective volatility, particularly for cold weather. In order that natural gasoline may be used to the best advantage, it is necessary that the vapor pressure of natural gasoline be limited so that it may be used in quantities up to 25 or 30 per cent without raising the vapor pressure of the final blend over about 12 lb. Obviously, smaller quantities of higher vapor pressure natural gasoline may be used without increasing vapor lock tendencies but with less improvement in acceleration.

With the increasing tendency to lower the front end of motor fuel in cold weather, it would seem that natural gasoline's natural function would be to assist in making this change by blending a greater percentage of natural with the same blending stock.

THE proposed American standard for chucks and chuck jaws has been released recently in tentative form by Technical Committee No. 11 of the Sectional Committee on Small Tools and Machine Tool Elements for general distribution to industry for criticism and comment. This proposal contemplates the standardization of chuck diameters, 11 sizes ranging from 6 to 36 in. having been fixed, gives in tabulated form dimensions for master jaws and removable top jaws, these having been determined with a view to obtaining interchangeability of the latter over a considerable range of chuck size, and covers some of the detail dimensions of certain other elements involved.

Those desiring an opportunity of examining this tentative draft with a view of transmitting comments to the committee may obtain a copy by addressing C. B. LePage, assistant secretary, A.S.M.E., 29 West Thirty-ninth Street, New York, N. Y.

JUST AMONG OURSELVES

Financing Means A Lack in Europe

APPARENTLY much still remains to be done in the development of adequate retail financing facilities for the sale of American automobiles in Europe. The larger organizations, such as General Motors, have satisfactory arrangements, we were informed the other day by a man long experienced with the sale of American automotive products in Europe, but the European dealer for the average car finds himself unable to get sufficient help in financing retail installment buying.

Despite unfortunate credit experiences in this field which have come to finance companies in a few instances, this expert insists that with proper credit control retail financing can be and has been handled for American dealers in Europe with negligible credit losses. Lack of available funds for retail financing, however, is, in his opinion, holding back European sales at the present time.

Getting Closer and Closer

WE see by the papers, as Phil Cook would say, that automobile and railroad executives have been hands-across-the-sea-ing again and that they have been jointly considering "general transportation with a view to reaching clearer understanding of their common problems."

"While no definite conclusions were reached at the meeting," this explicit (?) dispatch announces, "groundwork was laid and it is expected that future conferences will be held."

Our ear-to-the-ground department has developed the further information that not only will future meetings be held but that a small joint committee has been agreed upon which will keep on discussing from time to time the different transportation problems on which the two industries have usually failed to see eye to eye.

Proposed Freight Rates Versus Economics

IT'S quite natural that rail executives should wish the support of so big a shipping industry as the automotive in the fight for higher rates which they are now conducting. The automotive men, as a matter of fact, can doubtless be counted on to be sympathetic with the basic needs of the rail carriers, particularly if some practical mutuality of understanding seems to begin to develop.

In the specific matter of rates, nevertheless, it's hard for us to see just where automotive men have much cause for excitement one way or the other. The carriers recently reduced rates in an attempt to get back a lot of driveway and truckaway business which had been lost to them for some time. If rates are raised high enough, it is natural to suppose that the automotive plants will seek to ship their products by some cheaper route. Even if rates are kept low, factors of convenience, loading and unloading costs and speed may keep plenty of shipments off the rails anyhow. In other words, the attitude of the automotive executive toward rail rates seems bound to be that of any shipper in the long run. Even though

the rail carriers get the higher rates for which they are petitioning, like any other business they will still be faced with the economic problem of adjustment between price, volume and profits.

From Understanding Comes Progress

NOTHING but good can come from occasional meetings between truck and rail executives, however, as both industries are bound to come away with a clearer and keener understanding of the needs and purposes of the other. And with understanding, progress usually comes.

Tipper Calls The Shots

A GOOD many years ago Harry Tipper, now general sales manager, General Motors Export Co., said in a talk that:

The principles of business are philosophical;

The processes of business are psychological; and

The effects of business are economic.

For some of our readers that statement will furnish a basis for interesting contemplation and perhaps stimulating hours of fruitful discussion with others equally interested in the deepest fundamentals underlying our business and industrial structure. It was quoted to us again just the other day, which is what recalled it to our mind and caused its reproduction at this time.

Indeed, 'Tis A Strange World!

SILICA-GEL, we read the other day, is "a hard, glassy material in granular form with the appearance of clear quartz sand 1 cu. in. of which has an internal surface in excess of one acre."

That's certainly the height of something. At least it is further proof that appearances are often deceitful.—N.G.S.

Modern Heat Treating Equipment Cuts for Cleveland Tractor Co.

Unusual requirements met by special gas fired unit.
Two different degrees of hardness are produced
in single operation + + + + + + + +

METALLURGY is in step with production progress. With few exceptions the old days of cut-and-try methods and rule-of-thumb procedure in heat treating departments are gone. Today, the technical skill of the plant metallurgist capitalizes the latest developments in metals and alloys and the heat treating processes designed for these. And this results in a more rapid translation of scientific knowledge into actual practice than was ever possible heretofore.

Recently we had the privilege of going through the newly modernized plant of the Cleveland Tractor Co. Evidently tractor plants have changed a lot. This one now boasts a production assembly line as modern as any automobile plant. But, for the moment, we are particularly interested in the crawler shoe department, which houses all the machine shop and heat treating facilities for the shoe assembly, which consists of a drop-forged shoe, a roller, pin and two bushings. These parts are completely machined, heat-treated and assembled in this department.

Probably the outstanding thing in this department is a heat treating installation of the most advanced type. In this group are two pusher type furnaces, one gas-fired, one electrically fired, answering widely dif-

ferent requirements. Gas carburizing has replaced box carburizing entirely in this department. The equipment for this purpose consists of two gas-fired, and two electrically fired, horizontal rotary retort furnaces. All equipment is automatically controlled to produce uniform results within the desired limit of acceptance. The utilization of this new heat-treating equipment has definitely produced better quality, better controlled and at lower cost.

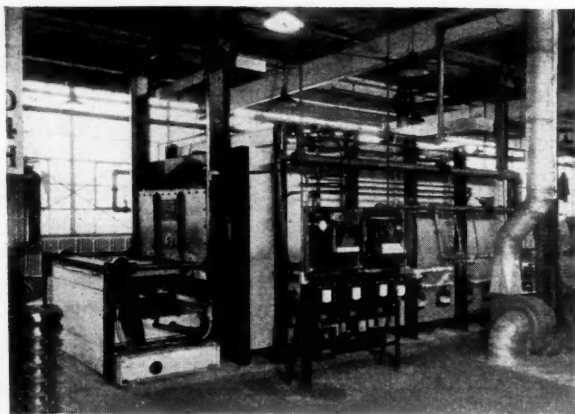


Fig. 1—Side view of gas-fired furnace, showing automatic recording controllers. Capacity, 2000 lb. per hour at 1480° Fahr.

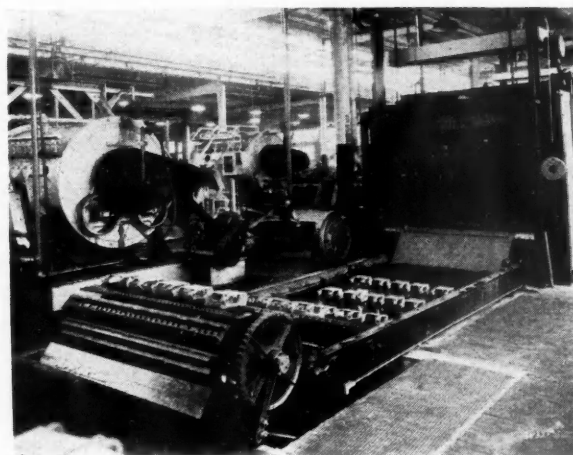


Fig. 2—Discharge end of shoe furnace. Conveyor quench, hardening rails only of shoes. In background, rear of two gas-fired rotary gas carburizers + + + +

The shoe department provides an interesting study. Raw material in the form of bars, tubing and drop forgings is received at one end, processed, heat-treated, drilled where necessary and assembled into a complete unit at the other. The shoe is a drop forging of S.A.E. No. 1045 steel. Heat treating requirements are rather unique. The rail or bottom wearing surface must be very hard; the rest of the shoe must be soft enough to facilitate drilling operations and yet have sufficient toughness to prevent track stretch. These requirements are met by the special Electric Furnace Co. installation shown in Fig. 1. This is a gas-fired, pusher

Costs to One-Third

by
Joseph Geschelin

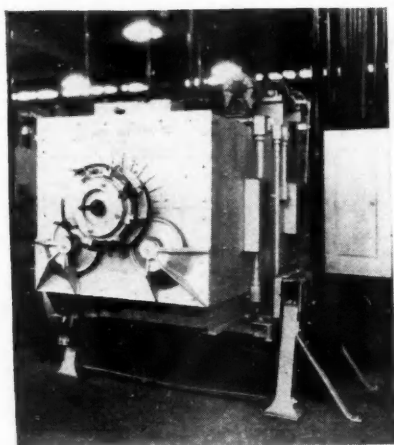


Fig. 3—One of the electrically heated rotary gas carburizers. Capacity 1000 lb. per heat. Used at 1700° Fahr., time dependent on case desired. Made by Hevi-Duty Elec. Co. + + + +

type unit, automatically controlled by two pyrometer controls, one of which is recording type. Capacity is 2000 lb. per hour. Shoes are laid directly on the flat hearth and are pushed through by means of a motor-driven pusher having a stroke of about 18 in. The work is heated to 1480 deg. Fahr., which anneals and refines the metal so as to produce the desired machinability.

At the discharge end of the furnace, shown in Fig. 2, the work passes down a slope plate onto a special flat conveyor type quench tank so constructed that only the lower or rail portion is quenched and chilled. The water level in this tank is maintained at a definite height, violently agitated and directed at the rail. Conveyor speed is variable so as to give the work from three to 15 minutes in the quenching medium according to requirements. The conveyor carries shoes out of the water when the rail is cold, but the rest of the shoe is 1000 deg. Fahr. This heat then travels back into rail, thereby drawing and relieving quenching stresses.

Naturally the striking thing about this installation is the automatic linking of almost antagonistic processes—the first phase, annealing and toughening; the second, a decided chilling. Upon emerging from the quench tank, the shoes are carefully inspected for surface hardness with a Brinell tester. The hardness of the rail is held between given limits. The rest of the shoe must be below a maximum for easy machining.

Automotive Industries

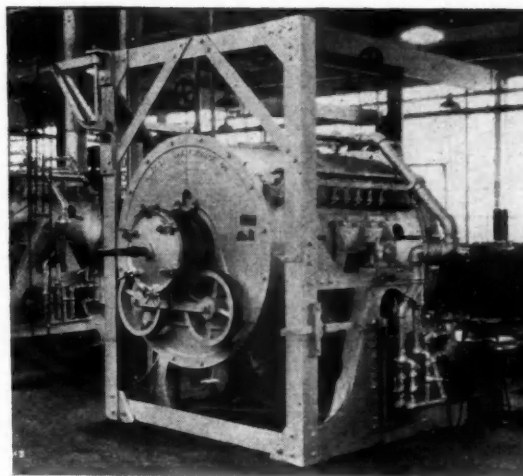


Fig. 4—One of the gas-fired rotary gas carburizers. Capacity of this furnace, 1200 to 1500 lb. per charge. Operated at 1700° Fahr. Made by the American Gas Furnace Company

After inspection the shoes proceed to the drilling operations.

From a production standpoint, the gas carburizing section is particularly instructive. The work consists of rollers cut from chrome nickel tubing; bushings of carbon steel tubing; and pins of low carbon steel containing 1½ per cent manganese. These pieces are mixed together indiscriminately and shoveled directly into the carburizing furnaces.

As mentioned earlier, the battery of gas carburizing furnaces consists of four machines. One of the two Hevi-Duty furnaces is shown in Fig. 3. This is a rotary retort furnace electrically heated and using natural gas for carburizing. It has three controlled zones on this installation arranged to maintain a retort temperature of 1700 deg. Fahr., the recorder on the central zone. The capacity of each furnace is 1000 lb. per hour.

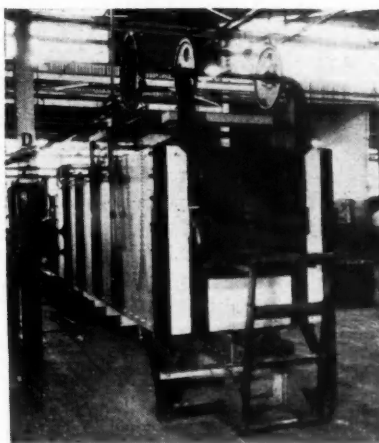


Fig. 5—Charging end of electrically heated V-groove hearth pusher type furnace for rollers, pins, and bushings. Capacity 800 lb. per hour used at 1350-1450° Fahr. + +

The other two carburizing furnaces are American Gas Furnace Co. installations, one of which is shown in Fig. 4. This unit is gas fired and uses natural gas for carburizing. These machines also are automatically controlled and maintain the work at 1700 deg. Fahr. The capacity of the furnace shown is 1200 lb. per hour. (Note—the other Amer. Gas carburizer is 600 lb. capacity.)

After the work

July 11, 1931



Fig. 6—Continuous electric pusher furnace (Electric Furnace Co.) used for hardening treatment on carburized rollers, bushing and pins for track assembly. In background, electric rotary carburizers show conveyor quench, using sodium hydroxide medium

has been held in the carburizing furnaces for the required time it is discharged directly into a basket in the floor level water quench tank. From this point it goes directly by overhead conveyor to the hardening furnace shown in Fig. 5, which is another type of installation made by the Electric Furnace Co. This unit is an automatic, pusher type furnace with a V-grooved hearth. Its capacity is 800 lb. per hour. Work is maintained at a temperature of 1350 to 1450 deg. Fahr. depending on material by automatic control of the heating zones.

At the discharge end, shown in Fig. 6, the parts leave on a laminated type conveyor which passes through a quench tank. The quenching medium is 6 per cent sodium hydroxide (caustic soda) which is violently agitated by means of a propeller and recirculated through a cooling system.

The conveyor discharges the work directly through a conveyor rinsing tank (added since the photo was taken) into a basket at the point of assembly, as shown.

Exact inspection tolerances for the heat treated surfaces have been set up on these gas-carburized parts. The inspection includes a check on the depth of case and a second check for surface hardness. Surface hardness is gaged by a scleroscope reading, while the depth is checked on a Rockwell tester. The tolerance on depth is C60 plus, minimum Rockwell; a routine Rockwell test is shown in Fig. 7.

Now what economy in the carburizing section? According to figures given by the metallurgist, one man takes care of the battery of four carburizing furnaces. Although the total capacity of this battery is about 11,000 lb. in 24 hours, the one man gives this section only a part of his time and devotes the rest of his time to other jobs. The economy of this installation, as compared with the original pack hardening set-up, is startling indeed. Taking into account all costs involved, the new installation operates at about one-third the cost. Yet the work is of better quality, more uniform, and with materially less rejections.

Fig. 7 — Rockwell tester used for hardness check on carburized rollers, pins, and bushings. A minimum of C60+ is maintained + +



Tachistoscope Helps Study of Motion

The Tachistoscope has been developed for the study of successive phases of varying motion through the projection of interrupted light flashes upon the object. When the instrument is so adjusted that these periodic flashes have a proper synchronous frequency, the moving body apparently stands still; or it can be made to appear moving slowly either forward or backward as the operator wills. It is an application of the same principle for producing the illusion of motion by a series of pictures viewed in rapid succession.

Light falling from a 200-watt incandescent lamp on a rapidly revolving mirror is mechanically interrupted, the number of separate flashes being made to correspond exactly with the revolutions of the moving part. The velocity of this revolving mirror, which has a speed range of from zero to 3300 r.p.m., permits of rapid synchronization and is controlled by a small friction drive disk at the back of the instrument.

This mechanism enables the operator to follow the moving part, whatever its velocity, and cause it to appear stationary, or turning slowly, forward or backward.

By pressing a button on the side of the tachometer the revolutions per minute of the moving body can be

recorded. No contact with the part being examined is necessary. The actual reading of the speed may be taken later as the hand on the dial stays in position until the button is again pressed for another reading.

This instrument, which is being manufactured by Robert Donner, 423 M. & T. Building, Buffalo, N. Y., is recommended for the study of any rapid periodic motion such as that of valve mechanism of automobile engines.

Status of Aircraft Instruments

The present state of development of aircraft instruments is summarized in N.A.C.A. Report No. 371, with emphasis on the present trend of development. The report includes sections on speed instruments, altitude instruments, navigation instruments, powerplant instruments, oxygen instruments, instruments for aerial photography, fog-flying instruments, general problems, and summary of instrument and research problems.

Report No. 371 may be obtained from the National Advisory Committee for Aeronautics, Washington, D. C.

Brownback "Bumble Bee" Three-Cylinder Light Aircraft Engine Is Air Cooled

HENRY LOWE BROWNBACk of Norristown, Pa., has designed a three-cylinder air cooled aircraft engine of which two drawings are shown herewith. While the engine is not in regular production at the present time, we understand that it is ready to be placed in production as soon as the market warrants it.

The cylinder bore is $3\frac{1}{2}$ in. and the stroke 4.13 in., giving a displacement of 120 cu. in. or nearly two liters. The cylinders are iron castings with integral heads and are held to the crankcase by four through bolts, a rubber oil seal being used at the joint. The valves are located in the head. They are made of silicon-chromium steel and are provided with double valve springs of chrome-vanadium steel. Rocker arms are made of nickel steel and mounted on needle bearings. The tubular push rods have means for adjustment at the upper end.

Pistons are of aluminum alloy, heavily ribbed internally for extra cooling, and provided with three piston rings. The piston pins are made of alloy steel tubing, case-hardened, and are of the full-floating type, being located endwise by duralumin buttons. Connect-

ing rods are alloy steel and of I-section type. The bearings in the connecting rod heads have a steel back which is faced externally with lead bronze and internally with babbitt; they are rigidly held together by forged bronze collars, which is said to be a patented feature.

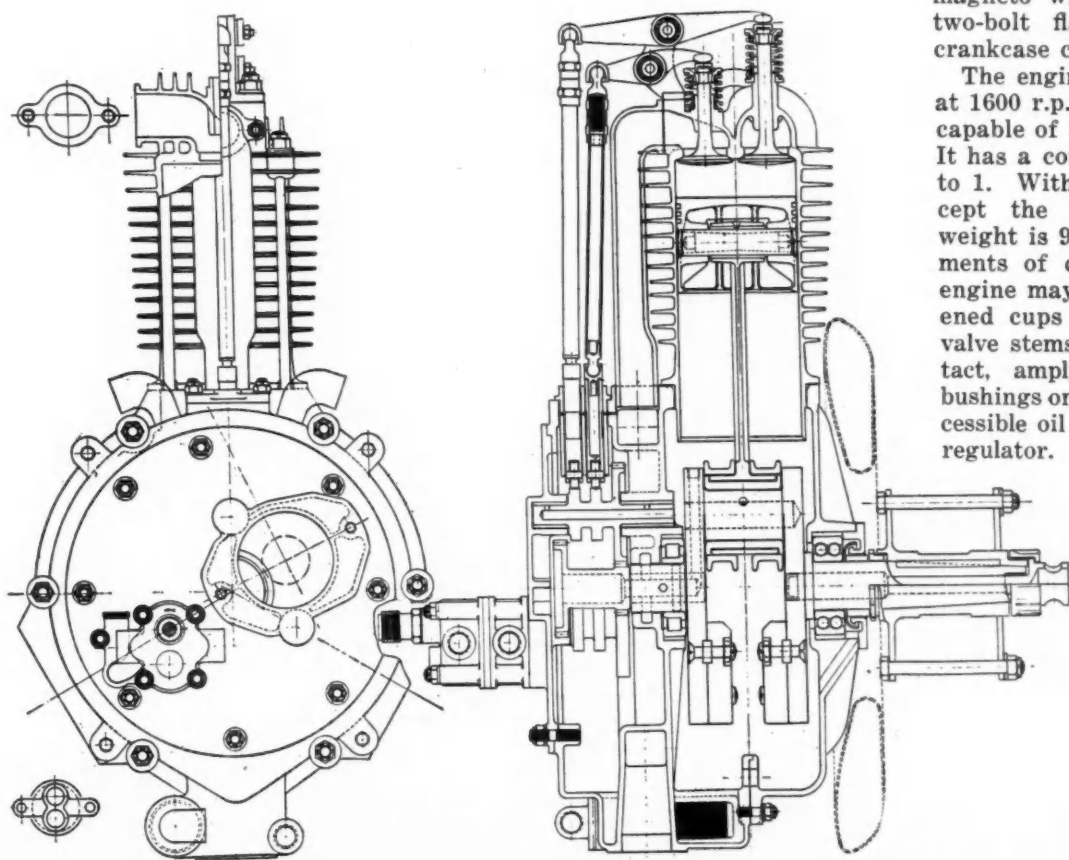
The crankshaft is made of alloy steel, heat treated, and mounted in ball and roller bearings; it is carefully counter-weighted. The crankcase is made of aluminum alloy castings, heat treated. The webbing of the front section is external, thus providing additional cooling surface and helping to keep down the temperature of the lubricating oil.

Lubrication is by the dry-sump method, a double oil pump (scavenging and pressure) being used and operating at one-half crankshaft speed. An accessible oil filter protects the scavenging pump from crankcase dirt. An oil pressure regulator is built into the pump.

A separate camshaft is provided for each cylinder. Roller type cam followers are used, and are provided with a patented leak prevention system which eliminates oil seepage at this point.

The carburetor has an S.A.E. $1\frac{1}{4}$ -in. standard flange and is mounted on the oil collector sump below the crankcase. Ignition is by a single magneto with S.A.E. standard two-bolt flange on the rear crankcase cover.

The engine is rated at 25 hp. at 1600 r.p.m. and is said to be capable of 30 hp. at 1800 r.p.m. It has a compression ratio of 5 to 1. With all accessories, except the propeller hub, the weight is 99 lb. Among refinements of design found in the engine may be mentioned hardened cups on the ends of the valve stems for rocker arm contact, amply lubricated bronze bushings on the camshafts, an accessible oil filter, and a pressure regulator.



End elevation showing crankcase and one cylinder, and cross-section through this assembly + + +

Fittings Control the Life of Metallic Tubing Subjected to Vibration

by R. L. Templin

METALLIC tubing such as is used for air, gas and oil lines in airplanes, automobiles and other machinery must frequently withstand vibrational stresses under the service conditions imposed. The magnitude of the stresses caused by vibration under service conditions is rather difficult to evaluate. While in most cases no troubles from this source are encountered, the fact remains that in some instances fatigue failures which are the result of vibrational stresses do occur.

It must be emphasized that the designer of a structure or machine involving the use of such tubing is to a large extent responsible for the proper installation of the tubing so that (1) it will be subjected to a minimum amount of vibration during service, and (2) if vibration occurs, the resulting stresses will be as small as possible. Many of the vibrational failures noted in the past can be directly traced to improper design of the supports or fastenings applied to the tubing. In other words, while it is by all means desirable to have a material with good fatigue properties, yet when good engineering design can overcome conditions which will cause early fatigue failure, such design should by all means be used.

The choice of tubing for a particular use, that is, whether it shall be steel, brass, copper, or aluminum, is often governed by factors other than the fatigue strength of the various metals. Such factors include resistance to corrosion, weight, appearance, ease of forming and price. Other things being equal, however, it is obviously desirable to have the material show fatigue characteristics as good as possible.

In the selection of a tubing on the basis of fatigue strength or vibration resistance, consideration must always be given not only to the fatigue strength of the tubing itself, but also to the kind and type of fittings that are to be used with the tubing. Experience has shown very definitely that the fittings are a

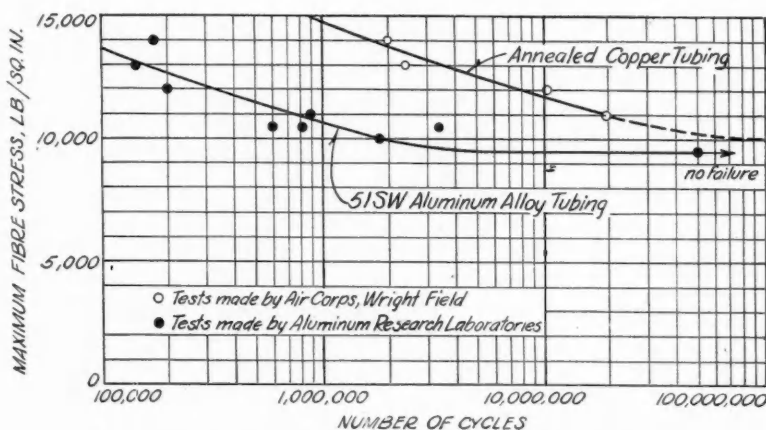
very important factor in determining the life of any tubing installation when subjected to vibration conditions. There is on the market today a large variety of patented fittings for use with tubing, some of which are appreciably superior to the others in resisting vibrational stresses. For obvious reasons the relative merits of these various kinds of fittings cannot be discussed here. The reader is referred to tests made by government departments and by the underwriters' laboratories for information pertaining to various types of tubing fittings.

The answer to the question, "What is the comparative fatigue strength of the various kinds of metallic tubing?" will be found in the results from service tests as well as from tests conducted in the laboratory. In spite of the many unknown quantities obtaining in

any service test, the results from such tests are usually given more weight than results from laboratory tests. Satisfactory service tests, however, usually involve a considerable amount of time for their completion, with the result that laboratory tests are resorted to for at least a preliminary indication of the answer.

Laboratory tests will give the correct answer if they are conducted in

accordance with the procedure indicated by the methods described in detail in the Proceedings of the American Society for Testing Materials. On the other hand, very misleading results may be obtained if an attempt is made to use highly accelerated tests. Such accelerated tests were emphatically condemned by the Research Committee on the Fatigue of Metals in their report before the A.S.T.M. of 1929, from which the following is quoted: "Nearly every investigator who begins a study of fatigue of metals is impressed with the ease and speed of making tests by applying a repeated high stress of some definite magnitude to specimens of different metals and noting the length of endurance of each metal. The committee



Endurance characteristics of copper and aluminum tubing

wishes to point out that as a *measure of the ability of metals to withstand repeated working stresses*, this method is utterly unreliable."

As a very good example of this point, some fatigue test results are shown in Fig. 1, for annealed copper tubing and an aluminum alloy tubing. It will be noted by reference to this figure that the endurance or fatigue limits of these two kinds of tubing are about the same, that is, 10,000 lb. per sq. in. When the two kinds of tubing, however, are tested under vibration conditions imposing a stress of 13,000 lb. per sq. in., the annealed copper tubing will withstand approximately $8\frac{1}{2}$ times as many cycles as the aluminum alloy tubing. In view of these facts, some users have selected annealed copper tubing under the impression that it was better, although in reality its endurance limit is practically the same as the aluminum alloy tubing. In service the fatigue stresses would be caused undoubtedly by vibrating below the endurance or fatigue limits of the materials, if good engineering design practice was followed.

The test results indicated in the accompanying graph were obtained on tubing in connection with certain fittings. Tests of annealed copper and the

Selecting tubing on basis of fatigue strength or vibration resistance, consideration must be given to kind and type of fittings to be used.

Many vibrational failures of tubing can be directly traced to improper design of supports of fastenings used.

51SW aluminum alloy in the form of solid round specimens, using the R. R. Moore type of rotating beam fatigue testing machines, indicated that the endurance limit of the annealed copper is about 10,000 lb. per sq. in., whereas for the 51SW aluminum alloy the endurance limit is about 10,500 lb. per sq. in. The slightly lower values for 51SW aluminum alloy tubing indicated in the graph may be attributed to the combination test of tubing and fittings.

Fuller Marketing Auxiliary 3-Speed Transmission of Constant Mesh Type

A NEW auxiliary transmission, known as the Model AY, has been placed on the market recently by the Fuller & Sons Mfg. Co., of Milwaukee, Wis. It has three speeds forward and is designed to be used with a regular four-speed transmission. As will be seen from the drawing, the transmission is made with herringbone gears and is of the constant mesh type. The sliding-clutch gear follows passenger car design, having its teeth relieved at the edges and alternate teeth cut back $\frac{3}{16}$ in.

In order to permit of a jackshaft housing being secured to the rear end of this auxiliary transmission after removing the end plate, the speedometer drive is located inside of the rear bearing on the main drive-shaft. The unit has provision for the installation of a power take-off, having an opening in the side for the S.A.E. large-size take-off.

This auxiliary transmission is designed for use on trucks and tractors of 5-tons load capacity and over, and to take a maximum input torque of 31,000 lb.-in.

All gears and shafts are made of $3\frac{1}{2}$ per cent nickel steel, case-hardened; the case is of nickel cast iron, and ball bearings are used throughout. The auxiliary transmission complete weighs 340 lb. and has an oil capacity of $6\frac{1}{2}$ qt.

An interesting feature of this transmission is the control, which has been designed to mount on the rear end of the main transmission.

The ratios available in the auxiliary transmission and in the combination of this with a four-speed

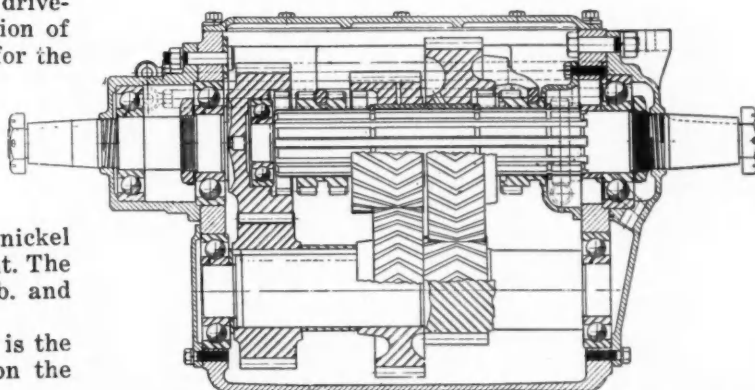
Model MHU transmission are given in the accompanying tables:

Gear Ratios—AY only

Overdrive	0.77-1
Direct	1.00-1
Reduction	1.99-1

Ratios available with AY mounted behind 4 speed model MHU

	Overdrive Range	Direct Range	Reduction Range
4th	0.77	1.00	1.99
3rd	1.33	1.73	3.44
2nd	2.43	3.16	6.29
1st	4.82	6.29	12.48
Rev.	6.06	7.90	15.70



This Fuller Model AY auxiliary transmission is of the constant mesh herringbone gear type + + + + +

Marmon-Herrington Four and Six-Wheel

by Athel F. Denham

BOTH four-wheel drive and six-wheel drive units are in the line of trucks recently put in production by the Marmon-Herrington Co., Inc., in a plant turned over to it by the Marmon Motor Car Co., Indianapolis. Eight-wheel drive units may be added later. At present the trucks are being built both for the general market and on government order, and it is planned to establish a dealer organization for national distribution.

In appearance these trucks resemble the standard type more closely than the usual four-wheel-drive type; they are built fairly low, with the front axle in the usual position ahead of the engine rather than below it. Steering is said to be remarkably easy, and with high-angle, constant velocity universal joints in the front axle, a maximum steering angle of 30 deg. and a correspondingly small steering radius are obtained.

The accompanying table shows major specifications of the line. The engines are of Hercules manufacture, and clutches, main transmission, propeller shaft, universals, rear axles and steering gears are also standard units. Front axle universals are of the Rzeppa type, manufactured by Gear Grinding Machine Co. of Detroit. (See *Automotive Industries* of July 19, 1930.)

The auxiliary transmission is of special manufacture. Mounted in back of the unit powerplant, this unit, with either two or three speeds, depending on the capacity of the truck, has a rather wide spacing between driven and driving shaft to provide the necessary propeller shaft clearance. Exceptionally large anti-friction bearings are used in this unit.

A polished cast aluminum shell is used for the fin-

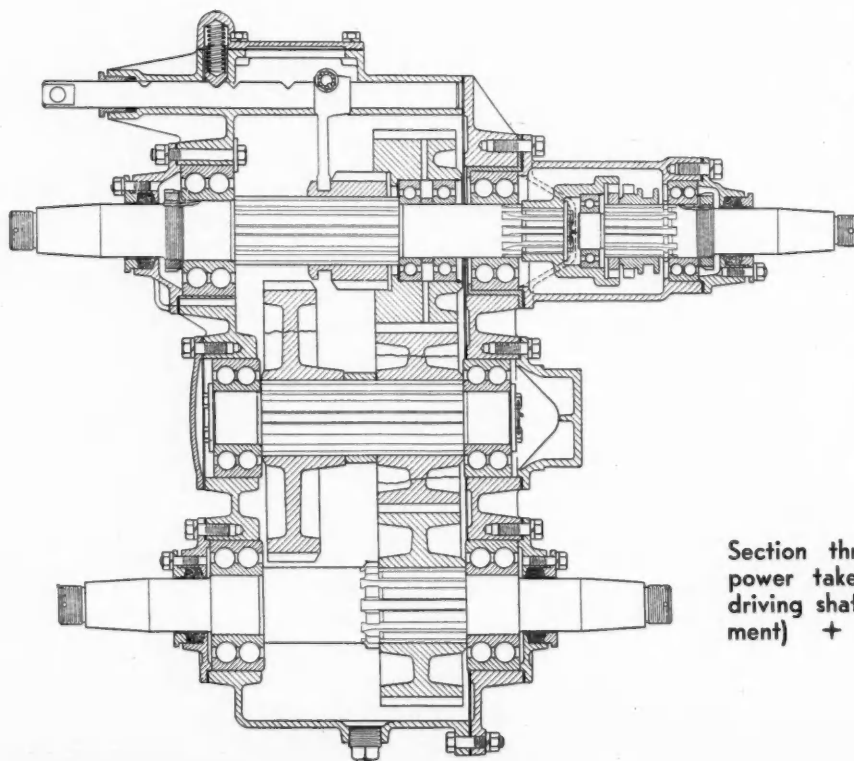
and-tube radiator, in front of which there is a chrome-plated grill. Fenders follow modern lines; hoods are provided with ventilating doors instead of louvers; the central hood hinge is covered with a tapered and chrome-plated molding, and the running board moldings also are chromium-plated.

Cabs have been designed for comfort. Ample leg room is provided and each seat has an adjustment with a range of 4 in. There are side cowl ventilators; the swinging windshield is mounted in rubber framing on all four sides and even window ledges are rubber-sealed to prevent the entrance of snow. There is a passenger-car-type instrument panel carrying an engine heat indicator and an air-pressure gage in addition to the usual instruments. Spark, throttle, and choke controls are also located on the instrument board, while a single central button on the steering wheel controls the starter, horn and lights.

The cab roof is of formed steel, fabric lined. The dash is provided with 2 in. of insulating material to provide protection against heat, cold and noise. The entire cab is built on a sub-frame which is flexibly mounted on the main frame at three points. The flexible mounting permits the close fitting of doors as a further protection in cold weather.

The radiator is also flexibly mounted, being supported from the side rails in vulcanized rubber bushings carried in steel sleeves. The equipment includes among other things a hydraulic jack.

Downdraft carburetion is used on all trucks. The carburetors are designed to prevent flooding at high angularities. The design also permits the use of a central exhaust outlet, keeping the exhaust heat away from the cab. The exhaust system includes a low back-pressure Burgess muffler of the "through" type. Intake manifolds are also of the downdraft type. Fuel is supplied by Stewart-Warner camshaft-driven pumps from either of two 25-gal. gasoline tanks mounted outside the frame side rails just back of the cab. There is a shut-off valve on each tank so that one can be used as a reserve if desired. An air cleaner is included in the fuel system.

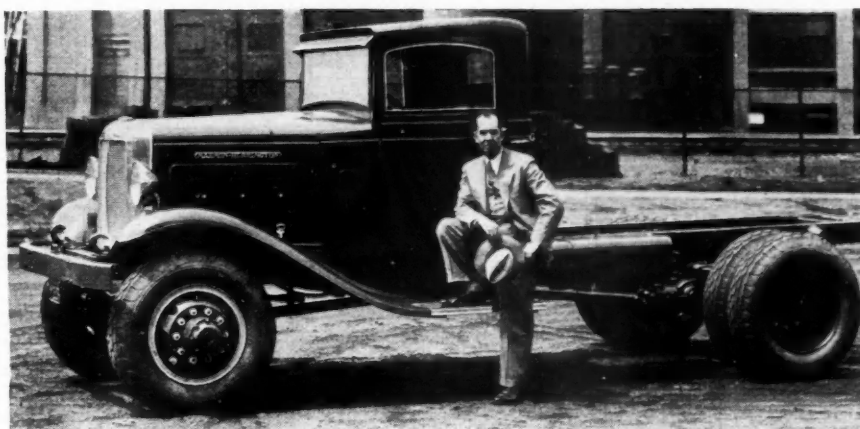


Section through transfer gear shows power take-off at right-hand end of driving shaft (furnished as extra equipment) + + + + + + +

Drive Trucks Now in Production

Ease of steering is
claimed for powerful
unit + + + + +

Eight-wheel drive may
be added to line later



Showing attractive conventional appearance of four-wheel drive truck being built by Marmon-Herrington Co., Inc. Arthur W. S. Herrington in foreground + + + + +

Specifications of Marmon-Herrington Four and Six-Wheel Drive

Model	T-30-4 & T-30-6	T-31-4 & T-31-6	T-32-4 & T-32-6	T-33-4 & T-33-6
Rated Gross Capacity				
4-wheel drive	18,250	22,950	30,200	37,200
6-wheel drive	24,750	31,900	39,700	41,200
Standard wheelbase				
4-wheel drive	158	160	190	190
6-wheel drive	184	186	208	210
Max. wheelbase				
4-wheel drive	180	180	230	230
6-wheel drive	204	206	228	230
Tractor wheelbase	138	140	165	165
Tire size, front	9.00/20	9.75/22	10.50/24	11.25/24
rear	same, dual	same, dual	same, dual	same, dual
Engine make	Hercules	Hercules	Hercules	Hercules
No. of cylinders	6	6	6	6
Bore and stroke	4 1/4 x 4 1/2	4 5/8 x 5 1/4	4 3/4 x 6	5 1/2 x 6
Displacement	382.5	529	638	885
Max. b.p.h.	94-2400	124-2200	136-2000	175-1600
Valve arrangement	L-head	L-head	L-head	L-head
Main bearings	7	7	7	7
Carburetor make	Zenith	Zenith	Zenith	Zenith
Type	downdraft	downdraft	downdraft	downdraft
Fuel feed	cam pump	cam pump	cam pump	cam pump
Electrical units	Delco-Remy	Delco-Remy	Delco-Remy	Delco-Remy
Clutch type	multiple disk	multiple disk	13 in. two plate	13 in. two plate
Transmission make	Fuller	Fuller	Brown-Lipe	Brown-Lipe
Mounting	unit	unit	unit	unit
Forward speeds	5	5	4	4
Auxiliary make	own	own	own	own
Forward speeds	2	2	3	3
Total forw. speeds	10	10	12	12
Universals, make	Blood	Blood	Blood	Blood
Axles, make	Wisconsin	Wisconsin	Wisconsin	Wisconsin
Rear, final drive	double-reduc.	double-reduc.	double-reduc.	double-reduc.
Front axle	double-reduc.	double-reduc.	double-reduc.	double-reduc.
Stand. ratio	7.00	8.00	7.79	8.123
Overall ratio in low gear	121.5-1	148-1	154.7-1	118.4
Service brakes	Air	Air	Air	Air
Size	17 1/4 x 4	17 1/4 x 5	17 1/4 x 5	17 1/4 x 5 1/2
Compressor capac.	6 cu. ft.	6 cu. ft.	6 cu. ft.	6 cu. ft.
Hand brakes	12 in. disk	12 in. disk	16 in. disk	Two 16 in. disk
Frame side rail	6 x 2 3/4 x 1/4	8 x 3 x 1/4	10 x 3 x 5/16	10 x 3 x 5/16
Steering gear	Ross C&L	Ross C&L	Ross C&L	Ross C&L
Springs, front	40 x 3	48 x 3	52 x 4	52 x 4
Springs, rear	50 x 3	50 x 3	52 x 4	52 x 4



The cab on the Marmon-Herrington truck is remarkably comfortable, all joints sealed to prevent entry of rain and fine snow + +

An unusual feature of the engine lubrication system is that it takes care also of the bearings of the 6 cu. ft. Westinghouse air compressor, which is mounted on the right side of the engine and driven through a universally jointed coupling.

Included in the cooling system are a thermostat in the cylinder head, and a four-bladed fan, Vee-belt driven.

Differential carriers in both sets of axles, front and rear, are interchangeable, and of the Wisconsin double reduction type. A variety of special gear ratios are

available. Models having Fuller transmissions are provided with an overdrive gear ratio in the transmission.

Foot controlled air brakes operate on all wheels, with four brakes on the four-wheel drive and six on the six-wheel drive trucks. The hand brakes are of the disk type, with two shoes on each of the two smaller sizes of trucks, four shoes on the T-32, and with two disks and eight shoes on the T-33. This brake is located between the main and auxiliary transmission, so that it also will operate through the auxiliary on all wheels.

The main frame is of interesting construction. At the front, at the center (approximately under the rear cab support) and at the rear end of the frame there are heavily gusseted channel cross-members. There are no cross-members, however, between the cab and the rear of the frame, this design having been adopted to insure the flexibility needed for four-wheel traction and to relieve strains on the front end of the frame. Wheels are of spoke-disk design.

A remarkable feature of the new trucks is their steering ease. Front wheels can be turned without undue effort with the truck at rest. The effectiveness of the universal joints used in the front driving axle is also evident from the smoothness with which the truck operates when driving it in a circle with the steering wheel cramped hard over.

Fuhrman Duals for Trailers Designed to Save Wear

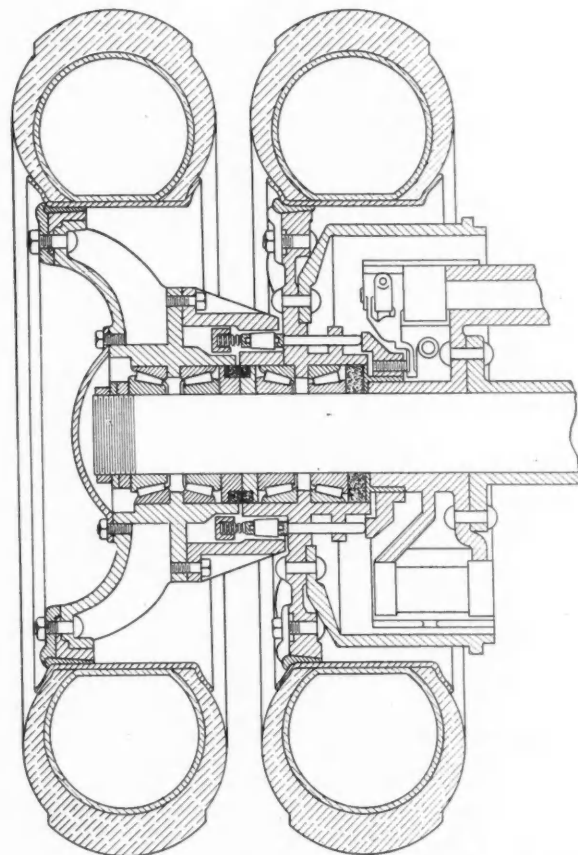
AN improvement in dual wheels for trailers has been made by the Fuhrman Trailer Co., Canton, Ohio, which permits each of the two wheels with its tire to rotate independently in describing curves, yet permits braking on both wheels.

When dual tires are mounted on a single wheel or on two wheels fastened together rigidly, in turning corners, although the lengths of the arcs described by the inner and outer tires respectively are different, the two tires must rotate at the same speed, which means that one or the other or both must slip on the ground. This not only increases the road friction, necessitating the expenditure of more power, but also results in more rapid tire wear.

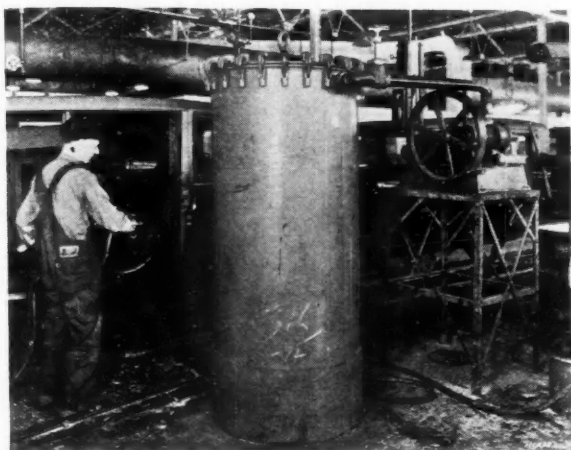
By using independent wheels, each mounted on two Timken roller bearings, with an interlocking device that operates only when the brakes are applied, it is possible to brake on both tires by the use of a single brake drum, and to prevent sliding of the wheels on the ground even on turns of short radius.

The invention, which is illustrated by the sectional view herewith, will also permit, it is claimed, the use of dual tires on the front wheels of heavy trucks and buses. Heretofore it has been impracticable to use dual front tires because the necessary slip of dual tires rotating as one unit made steering difficult. Tests are said to have shown that Fuhrman independent dual wheels steer as easily as single wheels, and that the tire wear is reduced as compared with rigid dual wheels.

Changing of tires is made possible by mounting the outer rim on a removable ring. This is said to make it easier to change the inner rim and tire than with present construction of dual wheels.



Section through the Fuhrman independent dual wheel which permits each wheel to rotate independently in turning corners and causes both to be locked together when the brake is applied + + + + +



PRODUCTION LINES

Spraying body deadener at the rate of 24 to 30 bodies per hour. Labor cost said to be about 3 cents a car. This is a familiar operation in many body plants

Illustration shows a recent installation in a large motor car plant. Consists of a Paasche F535 200-gal. pressure tank with a "Clamptight Cover." Paasche UUE airbrush, hose and accessories

What? Wages

Our contribution to discussions on wages. Why not a fund for foremen built up in better times, to be used in declines to maintain their scale? Isn't it feasible? Will certainly pay dividends in morale and cooperation. What do you think?

Largely on Color

Color is a big thing in our industry. If all the color used in automotive plants were spread out in a uniform ribbon it would reach from here to * * * * well to some distant place. Yet the handling, matching, and production problems are still vexing and acute. *Automotive Industries*, Dec. 6, 1930, told about the new technique now in the offing: The possibilities of uniform color standards by spectral distribution curves. Showed some of the machines recently developed for the purpose. Did you look it over? It's food for thought.

Watch Precision Instruments

Tool Tips, June, 1931, tells about a simple tool crib system at the Ex-Cell-O plant.

"To insure the return of precision instruments to the tool crib at the end of each shift, the following method has proved very satisfactory: The crib attendant keeps a standing file or desk spindle near the crib window, and on this he files the duplicate tool charge. As soon as the precision tool is returned, the charges are removed. During the few minutes before the end of the shift an alert attendant will glance over the charges remaining on the desk spindle and pass word on to the employees to be sure and return the instrument with which they are

charged before the end of the shift, which enables the men on the following shift to take advantage of all tools.

"If brass checks are used a record can be kept on a suitable pad and checked as outlined above."

Easier to Read

"Standardized, Interchangeable Die Sets," seventh edition of the well-known loose leaf catalog, ready for distribution by the Danly Machine Specialties, Inc. Considerable effort has been made to get this book more condensed and easier to read.

Highballing Synthetic Resins

Alkyds, Glyptals, Rezyls. Familiar to most of us as synthetic resins. Chemically termed phthalate resins, of polybasic acid type. Potentialities of these remarkable materials were given free rein this year, by cutting the Gordian knot of a confusing and intricate patent situation. Here is a quotation from the trade agreement published recently:

"It is now announced that the restraint upon the development of these synthetic resins on account of patents has been removed by a series of agreements. The parties to these agreements are General Electric Company and its controlled companies; E. I. duPont de Nemours & Company and its controlled companies; American Cyanamid Company and its controlled companies (including the Rezyl Corporation) and the Ellis-Foster Company which, together with Rezyl Corporation controls the inventions of Carleton Ellis in this field. The purpose of these agreements is to make it possible for each group to pursue its technical and commercial de-

velopment in this resin field with the assurance of immunity against prosecution of itself or its customers under patents that are at present owned or may shortly be obtained by the other groups.

Greater activity in this field is now expected. Watch for developments in paints, varnishes, lacquers, and undercoats.

Surface Quality Measured

How do we specify and judge surface quality? Wouldn't you be interested in standards as precise as tolerances on dimensions? The answer was given by R. E. W. Harrison of Cincinnati grinders at the last ASME annual meeting. His paper, "A Survey of Surface Quality Standards and Tolerance Costs," was reviewed in *Automotive Industries* Dec. 13, 1930. Mr. Harrison has just sent us a progress report based on recent work. Consists of oscillograph records on samples of cast iron, soft steel, case-hardened steel, and oil-hardened steel. Quoting Mr. Harrison:

"The oscillograph records clearly show the varying qualities of finish in each material and provide a valuable record in those cases where it is considered desirable for a record of the quality of surface to be kept for future reference."

Some Speed

Word comes that Perfect Circle, Hagerstown, has installed a new G. E. dynamometer for testing rings. Capacity 200 hp. Can operate at 4500 r.p.m. continuously. Highest previous speed with older equipment was 4000 r.p.m.

Even Trucks Do

Dodge goes pioneering again. Enameled truck parts now completely Bonderized. Better metal cleaning-longer lived finish.—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

Timken-Detroit Offers New Line of Trailer Axles

TIMKEN-DETROIT AXLE CO. has recently added to its lines of two and four-wheel driving axles the following:

1. A smaller tandem four-wheel-drive axle known as the SW 75, for lighter trucks.
2. A line of two-wheel-drive, four-wheel units with bevel, worm or double reduction final drive in the forward axle of the unit.
3. A complete line of two and four-wheel-unit axles for trailers.

In entering this field it is the object of the axle company to make available to truck operators and manufacturers axle parts, wheels, hubs, etc., as widely interchangeable as possible, thereby reducing the inventory of service parts that needs to be carried.

The SW 75 unit is designed for a gross load of 16,000 lb., and is composed basically of two worm-drive axles interconnected by springs rather than through load-equalizing beams, as in the larger SW series. It will be noted from Fig. 1 that provision is made for two sets of torque rods. The axle unit is carried from the frame at either side by a single-point suspension mounting. It is highly desirable, of course, to locate a frame cross-member at the points of support, and this cross-member could be used also for attachment of the torque rods.

The ends of the spring bear on pads on the forward and rear axle housings, and are free to slide with slight changes in length of spring, due to deflection. The parallel position of the two axles, of course, is maintained by the torque rods, torque reactions being taken in the same as on the larger SW series four-wheel units.

The development of four-wheel units with one live and one trailing axle is intended for certain types of light-duty service on first-class roads in level country, where greater load-carrying ability is desired. The general construction is similar to that of the SW 75 unit described above, interconnecting

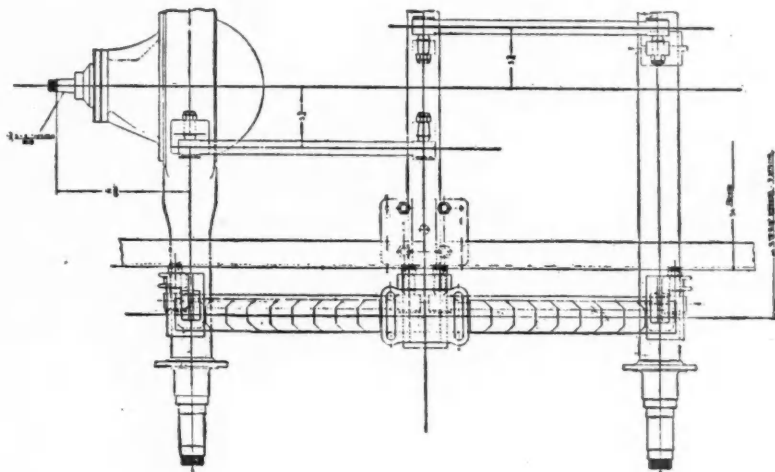


Fig. 2—Plan view of Timken SBT 75 series of four-wheel unit with two-wheel bevel drive + + + + +

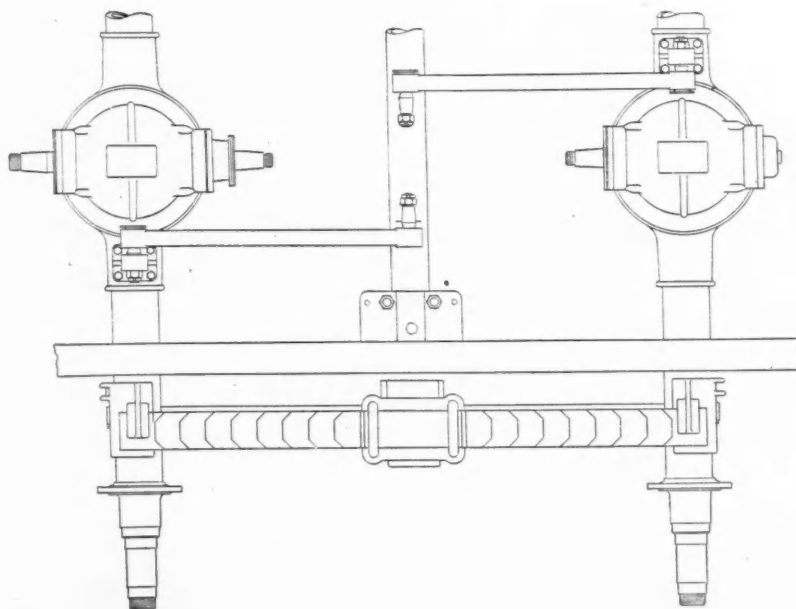


Fig. 1—Plan view of the SW 75 four-wheel drive axle unit for smaller trucks

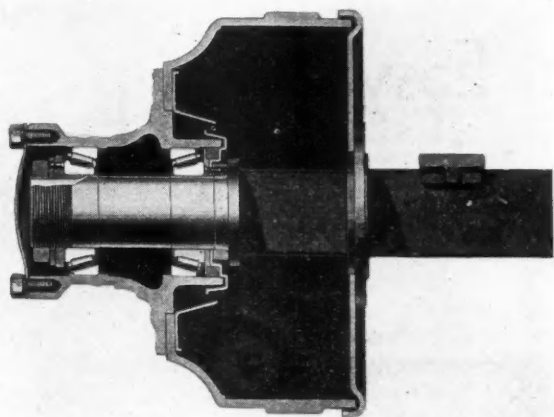


Fig. 3—Section through hub and brake drum of trailer axle + + + + +

springs between the live and trailing axle being used for load equalizing. The driving axle is a standard Timken 50,000 series, bevel drive axle, with a series 80,000 Timken trailer axle at the rear. A plan view of the layout is shown in Fig. 2. This type of unit is also available in worm drive for the live axle, a single-ended worm axle of the Timken SW series being used in this case, together with the 80,000 trailing axle. In this case SW series load-equalizing beams are used. The same applies to the availability of double reduction, a standard Timken SD axle being then used for the front unit.

The company also has in preparation a series of axles for use under trailers in six different capacities.

Brakes are assembled complete, ready for a slight final adjustment under the vehicle. Oil slingers are provided to prevent brake linings from becoming saturated with excess lubricant from the wheel bearings. Wheel or hub, brake parts and brake drums are interchangeable with corresponding parts of Timken

driving axles of the same nominal capacity.

These axles for trailers are available completely assembled with hubs for Budd wheels, brake drums and brakes, and wheel bearings are adjusted and locked. When hubs are assembled they are packed with bearing lubricant. When cast spoke wheels are desired the axles are furnished less the hubs.

For use with six-wheel trailers and four-wheel semi-trailers, Timken four-wheel units are available. These self-contained four-wheel units embody two trailer axles complete with brakes, load-equalizing

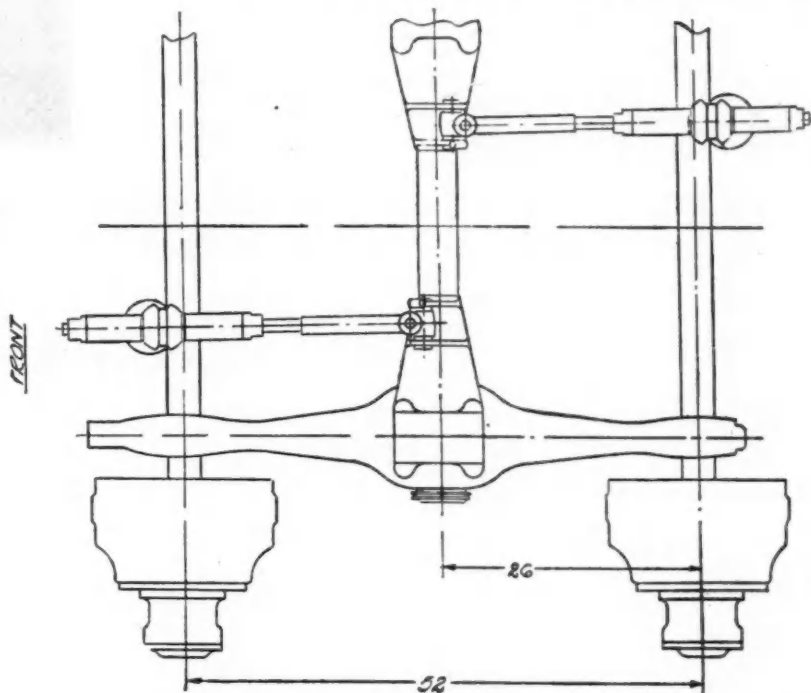


Fig. 4—Plan view of Timken ST series of four-wheel unit for trailers + + + + +

beam and braking torque reaction system.

Fig. 3 is a cross-section of the end of a trailer axle, and Fig. 4 shows a layout of a four-wheel unit for trailers, showing the interconnecting load-equalizing beam and torque-rod system that is found also on Timken truck axles.

France and Italy Propose Narrower Wrench Openings

ONE of the problems discussed at the recent meeting of the Committee on Automobile Standards of the International Standards Association (ISA), which was held in Berlin at the time of the automobile show there, was that of standardization of the bolts and screws used in automobile production.

Proposals were made by the representatives of France and Italy which provided for narrower wrench openings for cap screws and for lower heights of the heads of such screws than are now standard in metric countries.

German members of the committee stated that extensive trials with screws designed for smaller wrench openings and with smaller head heights were in progress, and the meeting therefore thought it

best to postpone discussion of the new proposals until the results of these investigations are available.

In this connection it was suggested that attempts should be made to unify screws made according to inch measurements and metric screws in those sizes where, with reasonable tolerances, the diameter ranges overlap. In this attempt the metric system is to be fundamental and the widths of wrench openings are to be so chosen that the ratio of wrench opening to the nominal diameter of the screw does not drop below that of American standard fine thread (automobile) screws.

As a first step in this direction charts have been prepared showing the variation in wrench opening with the nominal diameter of the screw for different systems of screws, including the Whitworth standard, the Whitworth fine thread, German standard and German automobile standard, French standard, S.A.E. standard (U. S. fine) and the French and Italian proposals.

Low-Cost Air Brake is Easy to Install on Current Models

AN effective air brake having a number of important considerations to recommend it is being marketed by the Rawson Air Brake Co. of Detroit. Major advantages claimed for it are:

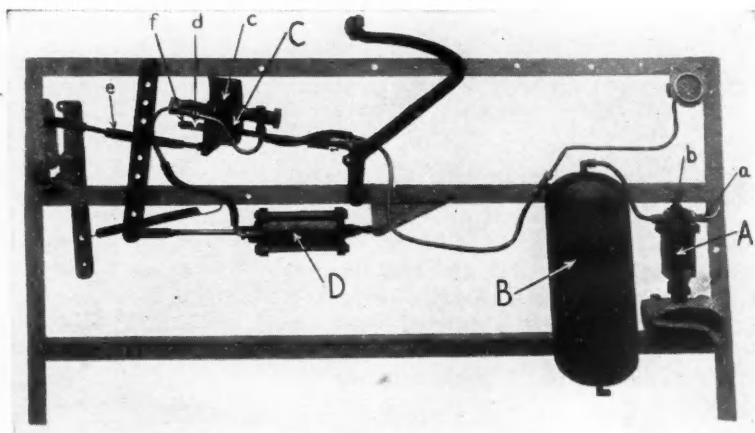
1. Low cost. List price is \$110.
2. Easy to install. Installation costs range from \$15 to \$25.
3. Control hooks into mechanical or hydraulic brake hook-up without affecting the system's functioning in case of failure of air supply.
4. Braking effort dependent on amount of pedal depression, and independent of foot pressure or air pressure (above the minimum required) carried in the storage tank.

Air pressure is obtained by a pipe connection leading from one of the combustion chambers to a circulating water-cooled accumulator valve, shown cut away at (A) in illustration. This is mounted on the cylinder head, the cooling water coming from the head jacket, and returning to the radiator through pipe connection (a). The accumulator valve proper consists mainly of a $\frac{3}{8}$ -in. steel ball with very small travel, equal to about one-quarter to one-half of a turn of the 20-thread-per-inch adjusting stud (b) located on top of the assembly. When the cylinder is fired, a charge of gases passes through the accumulator into storage tank (B). This tank is provided with a plug in the bottom for periodic draining of accumulated condensate from the gases.

This tank has a single outlet connecting to the control valve (C) and the dash-mounted pressure gage. It will be noted that there is a spring (d) under the adjusting nut (f) of this rod, the weight or pressure of this spring being varied to suit the different installations.

The control consists of two opposed units, the one at the rear being the exhaust valve for the system, and the one toward the pedal the inlet valve. Both are operated by plungers from the single flat actuating member shown in the center, and working with the pedal pull rod.

As the pedal is depressed, movement of the actuating member (c) permits the exhaust valve to close by releasing the plunger pressure. Further movement begins to open the inlet valve by depressing its plunger, permitting air to enter cylinder (D), which contains a leather piston attached to a rod connected either directly to a bell crank lever in the existing hook-up, or else to another lever supplied by the brake manufacturers, hooking positively into the existing brake system.



Showing simplicity of installation of low-cost air brake

The action of the piston is similar to that of a conventional booster, in that it only removes the load from the pedal if spring (d) is properly adjusted. In case of failure of air supply either just after starting up the vehicle, or in case of leakage or breakage in the connections, depression of the foot pedal will exert a pull on the floating control assembly (C) which in turn will exert the normal pull on the braking system through rod (e) as if no air brake were present. Several brake cylinders can of course be installed on a given vehicle, but in every case the cylinders of course must be hooked up to the same brake system, whether foot or hand, as the control unit. The latter is shown here with the cover partly removed to show the operation.

Proposed Chuck Standard Issued

THE proposed American standard for chucks and chuck jaws has been released recently in tentative form by Technical Committee No. 11 of the Sectional Committee on Small Tools and Machine Tool Elements for general distribution to industry for criticism and comment. This proposal contemplates the standardization of chuck diameters, 11 sizes ranging from 6 to 36 in. having been fixed, gives in tabulated form dimensions for master jaws and removable top jaws, these having been determined with a view to obtaining interchangeability of the latter over a considerable range of chuck size, and covers some of the detail dimensions of certain other elements involved.

Those desiring an opportunity of examining this tentative draft with a view of transmitting comments to the committee may obtain a copy by addressing C. B. LePage, assistant secretary, A.S.M.E., 29 West Thirty-ninth Street, New York, N. Y.

Welding Technique Now Opens Wide Field for Rustless Steel

Welds are extremely tough and when made on No. 10 or lighter gage will stand bending flat upon themselves + + + + + + + + +

By G. Van Dyke

Manager, Special Steel Department,
Joseph T. Ryerson & Son, Inc.

BECAUSE 18-8 rustless steel lends itself readily to welding by the electric, gas or spot processes, its production has opened up a large field of application which was barred to other of the so-called "stainless steels" because they could not readily be welded.

The corrosion resistance of an alloy depends not only on its composition but also on the care taken in its manufacture and upon its structure. Bearing this in mind, it is very important that the welding of this alloy should be done in such a way that neither the analysis nor the structure of the metal will be changed; and for this reason, the chemistry of the flame in gas welding is of vital importance.

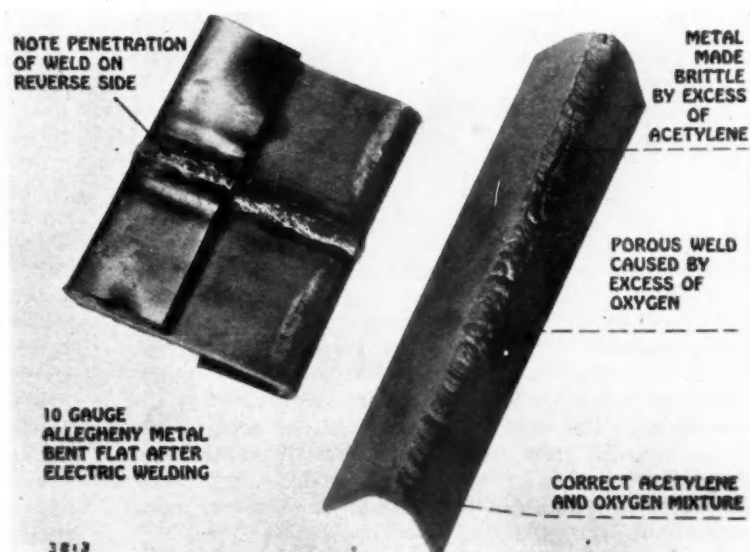
The first consideration in gas welding 18-8 rustless steel is to get the proper mixture of acetylene and oxygen. If an excess of oxygen is used, it will burn up or oxidize a considerable portion of the chromium, and this not only changes the analysis of the metal but produces oxides of chromium which will cause the metal to boil and produce welds which are porous and of low corrosion-resistance value. If an excess of acetylene, which is a compound of hydrogen and carbon, is used, the molten metal will absorb a certain amount of the gas, and the carbon content of the weld will thereby be raised. This increase in carbon content is very detrimental to the corrosion resistance and produces a brittle weld.

From what we have said, it would appear that an exactly neutral flame with neither an excess of acetylene nor oxygen would be desirable, and if it were possible to get such a flame, it would probably be ideal. In actual practice, regulators are not sufficiently accurate to produce a truly neutral flame; and, therefore, the lesser of two evils must be chosen, and the flame should be adjusted so as to give a very slight excess of acetylene, which is in-

dicated in the flame by very short "feather tips" on the end of the combustion buttons. In gas welding this alloy, the torch should be held as close to the metal as possible, so as to push the flame down into the weld, and the rod should be held above the weld so that it will melt and drop down as you go along. Puddling should be avoided, as it tends to produce a porous weld. If the flame is properly adjusted and sufficient heat is used, the welding rod will melt freely and will drop down in clean drops.

For those who like to use a flux, I recommend the product of the Oxweld Acetylene Co., known as "Chromaloy" flux, which has a tendency to make the metal flow a little more freely and is of assistance in securing deeper penetration.

I would recommend the use of a tip one or two sizes smaller than would be used on the same gage of steel, and in most cases about five pounds pressure on both the acetylene and oxygen will be found sufficient.



Examples of rustless steel welds showing effect of improper mix of oxygen and acetylene + +

It is essential that accurate regulators be used so that a uniform mixture can be maintained continuously.

In electric welding by the metallic arc process, we do not have to concern ourselves with flame chemistry as we do in gas welding. It is important, however, that the rod be of the right analysis and that the coating on the rod be of such a character that it will produce sound welds, deep penetration and a bead of equal corrosion resistance to the parent metal. The production of and coating of the rods is a technical matter which is best left to the manufacturers of the metal, and if any good operator will bear the points mentioned in this article in mind, he will be able to produce a good job.

Recommends Reversed Polarity

In the first place, reversed polarity should be used. That is to say, that the electrode should be connected to the plus pole of the generator and the work or ground connected to the negative pole of the generator. It is well to use rather less power than would be used on a similar gage of steel, although this is a point which is best worked out by each operator himself. Some men can weld more rapidly than others and, therefore, can use a greater amount of heat. After a little experience, each operator will find the best voltage and amperage setting for his particular machine on various gages.

A welding outfit should be provided which has very flexible controls, because variations in voltage and amperage are rather critical on this alloy.

A short arc should be used partly because it will give a more uniform penetration and partly because with a short arc there is less chance of the molten metal becoming oxidized and thus producing porous welds.

Backing up is to be recommended where possible, and in each case the operator should be provided with samples on which to experiment for power adjustment and arc length before he starts on any job.

The scale produced on these welds is usually heavy and hard, and it would be found very helpful if the scale is ground off the bead left by one rod before starting the continuation of the weld with the next rod.

There are certain general principles concerning all types of welding on rustless steel, and I would like, therefore, to offer the following for your very careful consideration.

In the first place, when this metal is heated to any temperature in excess of about 450 deg. Fahr., it will discolor or oxidize on the surface. This oxidation must be entirely removed as it will rust rapidly, and the rust will spoil the appearance of what might otherwise be a very good piece of work. Oxidization can be removed by grinding, or can be taken off by the application of a mixture of one part of commercial nitric acid to one part of commercial hydrochloric acid. This acid mixture is extremely powerful and should only be left on the metal for a sufficient length of time (probably a few minutes) to remove discoloration. It is absolutely essential that every trace of the acid be removed from the metal first by washing with water, and then following this by a thorough washing with soap and water in which has been dissolved some sal soda, ammonia or other alkali.

If this steel is to be used to resist severe corrosive attack, then it is essential that it should have the right metallurgical structure, this term meaning that the carbon should be in solution in the iron and not in the

form of carbides which are chemical combinations of iron and carbon.

It is unfortunately true that metals of the 18-8 type if heated to temperatures within the range of 950 deg. to 1550 deg. Fahr. will during certain periods of time, and depending on the temperature, undergo a structural change in which some of the carbon will be precipitated from the solution and be converted into an iron carbide, or perhaps an iron chromium carbide. These carbides accumulate along the grain boundaries of the metal, and if the metal is then subjected to heavy corrosive attack such as nitric acid, hot salt water, copper sulphate solution and so forth, electrolytic effect may be developed which will destroy the metal.

It is obvious that in welding the metal is at some point heated to these temperatures and, therefore, there is always an area adjacent to the weld which will have a lower corrosion resistance than the parent metal. This change of precipitation does not occur instantaneously, but requires a certain amount of time to develop. It is obvious because a No. 24 gage sheet will cool more rapidly than a 1/4 in. plate that precipitation is less likely to occur in light gage work than in heavier thicknesses.

It should be noted that where carbide precipitation has occurred it can be eliminated by heating the metal to a temperature of about 1950 deg. Fahr., followed by a cooling sufficiently rapid to prevent further precipitation. The method of cooling will, of course, depend on the thickness of the section, and the details of such operations should be discussed with the manufacturers of the metal.

Metals of the 18-8 type will expand when heated about 50 per cent more than steel, and the heat conductivity is only about one-half that of steel. These two factors tend to make the metal warp more than steel, and this point must be taken into careful consideration in all welding jobs. Jigs must be used to hold warpage within practical limits.

Welds in rustless steel are extremely tough, and any welds made on metal about No. 10 gage or lighter should stand bending flat on themselves without fracturing.

Plan Faraday Centennial

TO commemorate the discovery of the principle of magnetic induction by Michael Faraday in August and September, 1931, the Royal Institution and the Institution of Electrical Engineers have arranged to hold Faraday centenary celebrations during the week beginning Monday, Sept. 21, next.

A Faraday commemorative meeting arranged by the Royal Institution will be held at Queen's Hall, London, on the evening of Sept. 21, and on the morning of Tuesday, Sept. 22, as part of the I.E.E. summer meeting, which will be held from Sept. 22 to 25 in conjunction with the centenary celebrations, a conference will be held at the Kingsway Hall, London, W.C. 2.

The Institution of Electrical Engineers will be responsible for the Faraday Centenary Exhibition to be held at the Royal Albert Hall, London, from Sept. 22 to Oct. 3, 1931. This exhibition, which is intended to demonstrate in a practical manner the benefits which have followed from Faraday's discoveries, is being organized by means of funds provided by the Institution of Electrical Engineers. The Central Electricity Board and the principal associations connected with the electrical and chemical industries are cooperating with the institution in the organization of the exhibition.

Standardization of Socket Wrenches Effects Economy for General Motors

THE General Motors Corp. tool standard committee early this year held a meeting with leading socket wrench manufacturers to draw up a plan for standardizing production socket wrenches. It was found that the numerous designs of this type of small tool caused confusion in the factories which bought from several wrench manufacturers.

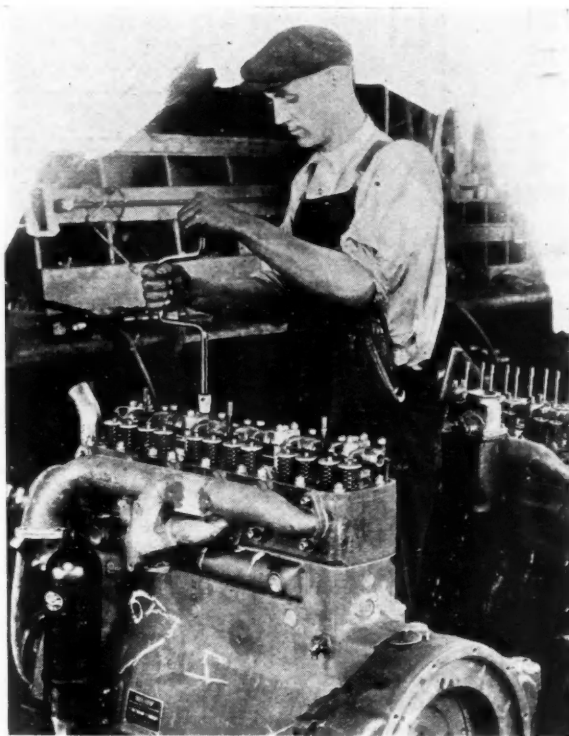
Interchangeability was of most important consideration from an economic standpoint, because it tends to reduce inventories, since many wrench combinations can be built up with a comparatively small stock. Worn-out sockets could thus be quickly replaced without scrapping the handle or power shank.

"All early types of interchangeable socket wrenches had certain drawbacks, however," according to E. M. Pfauter, chief engineer of Blackhawk Mfg. Co., Milwaukee.

"Wrench manufacturers, recognizing this fact, set about to build up a line that could properly handle production assembly work. Various designs of sockets, handles, and power shanks were devised—each maker developing his own standard. The result was that interchangeability between various makes was lacking.

"From the user's standpoint, these individual wrench standards were confusing and expensive—since the adoption of any one make of socket wrenches precluded the use of those made by other manufacturers. This was a great disadvantage to the wrench manufacturers as well, as it retarded the universal acceptance of socket wrenches.

"Where before many different types of drivers, such as oval and odd square sizes, had been used, the new G.M.C. standard established uniform sizes. Means of fastening sockets to handles and shanks were discussed, with the result that previous devices, such as friction-drive, setscrew, etc., were discarded in favor



Detachable Blackhawk socket wrench used on motor assembly line + + + + +

of the "lock-on" type. Socket and handle clearances were reduced to a minimum in order to eliminate unnecessary wear."

Nose diameters of sockets were also standardized to suit average conditions and provide sufficiently thick walls for the stress on the socket. Wall thicknesses increase proportionately as the size of the socket opening increases.

In connection with the work of socket standardization, the nut setter shanks, or wrench drivers, were given due consideration. There were brace bits, hexagon shanks, threaded shanks, chucks, morse taper and many other varieties.

With the standardization, only the hexagon shank used on electric nut setters and the Morse taper shank, generally used on the pneumatic types, were selected.

While the present G.M.C. standard includes only sockets and power drivers, other type wrenches are being standardized at this time.

The new G.M.C. standard of socket wrenches for production assembly work is said to offer many advantages to all progressive manufacturers. With interchangeability between all makes assured, the user will be able to buy standard socket wrenches like any other small tool or supply item out of stock.

Schrader Develops Valve Tool

A SCHRADER'S SON, INC., Brooklyn, N. Y., has placed on the market a duplex valve converting tool for bending the new standard valve adopted by the Tire and Rim Association at its meeting on April 16 last to adapt them for use with the particular rim and wheel with which they are to be used.

Under the new standard, the valves are supplied in straight form for the smaller size tubes, and in single-bend form for the larger size. They can then be bent to meet the requirements of any particular case by means of the Duplex bending tool.

Automotive Oddities—By Pete Keenan

CHARLES M. SCHWAB SAYS HE WISHES HE COULD LIVE OVER AGAIN ONLY ONE EPISODE OF HIS LIFE: THAT IN WHICH HE REFUSED TO FINANCE THE WRIGHT BROTHERS AVIATION VENTURE.



RATHER THAN GIVE HIS ANCIENT AUTO TO THE KEEPING OF A GARAGE, DR. F. H. PEARSE OF PLYMOUTH, ENGLAND, THROUGH SENTIMENT IS GIVING IT A GRAVE OUTSIDE A CEMETERY.



STRUEMPELL PLUG INVENTED

Had propeller on end to keep mixture agitated and so prevent corrosion of electrodes.



IN WALES THEY WERE TESTING THE SOBRIETY OF DRIVERS BY HAVING THEM REPEAT

"A HANDSOME HIPPOPOTAMUS IN A PETROL PERAMBULATOR"

THE ODOMETER WAS KNOWN LONG BEFORE THE CHRISTIAN ERA, AND THE SPEEDOMETER WAS ANTICIPATED IN 1521.



Surface-Ground Spring Plates Have Increased Fatigue Resistance

RESEARCHES on spring plates carried out in England during the past several years have brought out the fact that the hardening and tempering operations have an injurious effect on the surface material of such plates and that the fatigue resistance of a plate hardened and tempered in the usual way, without any subsequent machining operations on it, is considerably lower than that of plates of the same material which are later ground on their surfaces to remove the surface material. The thickness of the affected layer was found to be quite small, and the so-called "surface effect" was practically completely removed by machining $1/16$ in. from the surface. These results were obtained by the Springs Research Committee of the Department of Scientific and Industrial Research and were made public in a paper on Fatigue Strength of Carbon and Alloy Steel Plates as Used for Laminated Springs, which was read at a recent meeting of the Institution of Mechanical Engineers by R. G. C. Batson and J. Bradley.

Tests carried out in 1925 and 1926 on complete laminated springs showed that the limiting ranges of stress obtained were only from 22 per cent to 40 per cent of the ranges of stress which the materials would withstand in the form of turned and polished specimens, and they appeared to indicate the existence of a source of weakness in the outer skin of the plates of which the springs were composed. Tests were then started to determine whether a noticeable improvement could be made in spring plates by grinding or polishing them so as to remove the outer skin. Later, when such an improvement had been found, the tests were extended to determine the effect of heat treatment on the fatigue strength when such treatment was carried out either before or after machining the surface of the plates.

Repeated loading tests on complete laminated springs were made in a machine specially built for the purpose. The springs were supported in this machine on links fitted with ball bearings and carried a dead load at

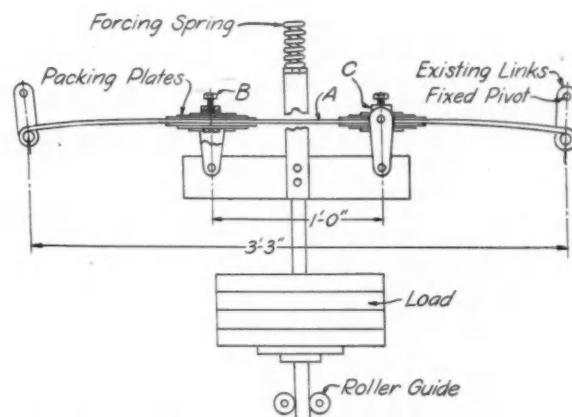


Fig. 1—Machine for testing single leaf of laminated spring + + + + +

the center equal to the mean load to be imposed during the test. The center of the spring was connected to a light helical spring, the other end of which was subjected to a simple harmonic motion having a period which could be regulated so that its ratio to the natural period of oscillation of the spring under test (and its load) could be maintained constant. By varying this ratio, the amplitude of the oscillation and, consequently, the range of stress could be given any desired value.

To obviate the necessity of grinding all of the leaves of a complete spring, the later tests were made on single plates, the load being applied in such a manner as to produce a substantially uniform stress over a fair proportion of the length of the plates. As shown in Fig. 1, the test piece A was in the form of a master leaf of a spring and the clamps B and C were arranged so that the load was applied at two points 12 in. apart, which arrangement gave a uniform bending movement over the central portion of the test piece. A preliminary calibration of the test piece was made by loading with dead weights and observing the deflection and the change in curvature produced. From the change in curvature the stress in the test piece was calculated. When the calibration was completed the endurance test was carried out by running the machine at the required amplitude of oscillation. The test was continued until fracture occurred, or until 6×10^6 oscillations had been completed. An entirely new machine was built for this test, which could be run at 1000 to 1500 oscillations per minute. The stress was calculated from the change in radius of the test piece.

A first series of tests was made to ascertain the effect of grinding away the outer skin of the plate on the limiting range of stress under repeated loadings. Both carbon steel and silico-manganese steel were used in these tests of the following chemical compositions: DIE—0.02 C., 0.093 Si., 0.038 S., 0.049 Ph., 0.65 Mn. DPH—0.57 C., 0.070 Si., 0.040 S., 0.043 Ph., 0.62 Mn. DSN—0.61 C., 0.080 Si., 0.039 S., 0.037 Ph., 0.86 Mn. DYY—0.51 C., 1.85 Si., 0.036 S., 0.038 Ph., 0.84 Mn.

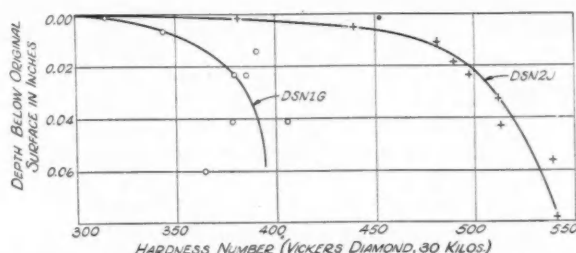


Fig. 2—Variation of hardness of material with depth below surface of hardened and tempered plate + + + + +

All of the steels were hardened and tempered, with the exception of DPH, which was unhardened. Plates 2 in. wide by $\frac{3}{8}$ in. thick were made of each steel. Hardness figures (Brinell) for the different steels were as follows:

DIE, 340-360; DPH, 217-220; DSN1, 350-370; DSN2, 460-490; DYY, 390-400.

The specimens of DIE steel were tested at 200 cycles per minute on the machine built for testing completely assembled springs, while all other specimens were tested at 1000-1500 cycles per minute in the high-speed testing machine. The machine test pieces of materials DSN1 and DSN2 were left with a ground finish; the other specimens were milled and finished with emery cloth. Material DPH was also tested in a Woehler endurance-testing machine and then gave a limiting stress range of plus and minus 46,000 lb. p. sq. in., whereas the same material when tested as a spring leaf with 1/16 in. removed from the surface gave plus and minus 44,000 lb. p. sq. in. The results of the endurance tests on these specimens with the surface untouched and with 1/16 in. removed from the surface, respectively, were as follows:

Mark of Steel	Estimated Limiting Range of Stress lb. per sq. in.		Ratio
	Surface Untouched	1/16 In. Removed	
DIE	10,000 — 40,000	10,000 — 95,000	0.35
DPH	— 25,000 to + 25,000	— 44,000 to + 44,000	0.57
DSN1	0-42,000	0-128,000	0.33
DSN2	0-30,000	0-146,000	0.21
DYY	0-63,000	0-111,000	0.57

The limiting ranges of stress of all samples when tested with 1/16 in. removed from the surface were such as would be expected from machined test pieces of these materials. It was therefore evident that by machining 1/16 in. from the surface the full intrinsic fatigue strength of the steel spring plate was obtained. The results showed that with the materials used the surface layer of the plate was the cause of a greatly reduced fatigue strength, which was between approximately one-quarter and one-half of the intrinsic value of the steel.

The fatigue range reduction was less in the silico-manganese steel than that of the carbon steels, and it was noticed that the silico-manganese steel plates were much smoother and more nearly free from initial curvature than the carbon steel plates. These plates had been heat-treated in an atmosphere which tended to reduce decarburization to a minimum.

Hardness tests were made on the test specimens at different distances below the surface, and the results are shown in Fig. 2. The test pieces were prepared on a surface-grinding machine by grinding a surface inclined at an angle of approximately 1 deg. to the original surface, and hardness tests were made at different points along this incline by means of a Vickers hardness machine. It will be seen that the hardness fell very rapidly near the surface. The carbon content of a layer 0.012 in. thick, machined from the surface, was determined by chemical analysis and found to be 0.41 per cent, as compared with 0.61 per cent for the body of the plate.

A second series of tests was carried out to determine whether the "surface effect" of heat-treated spring plates was due to the heat treatment. Fatigue tests on complete chromium-vanadium springs had indicated that any improvement due to grinding the plates before heat treatment was very small. The limiting range of stress on the master leaf was increased from 36,000 to 37,500 lb. p. sq. in., while the intrinsic range of stress for the material was approximately 123,000 lb.

p. sq. in. These results were not regarded as conclusive, and a series of tests was therefore made on a carbon steel and a silico-manganese steel of the following compositions:

ELR—0.57 C., 0.07 Si., 0.040 S., 0.043 Ph., 0.62 Mn.
EGI—0.53 C., 2.06 Si., 0.032 S., 0.040 Ph., 0.81 Mn.

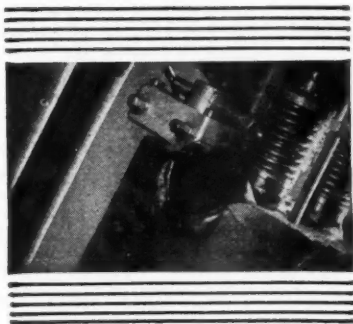
The results obtained confirmed those obtained with the chrome-vanadium steel laminated springs, and showed that the improvement in the fatigue resistance of plates with the skin untouched after heat treatment, was only very small. The general conclusion appeared to be that "surface effect" is due to heat treatment. All of the heat treatments were carried out in the manner adopted for the production of laminated springs, and such heat treatments were made by well-known spring makers. It was noted that the "surface effect" with silico-manganese steel in the second series of tests was more pronounced than that with this kind of steel in the first series of tests. The two batches of steel were supplied by different makers.

Considerable difficulties were experienced by the spring makers in heat treating the 0.57 per cent carbon steel after the surface had been machined. Four batches were machined and heat-treated before a batch with a sufficient number of sound pieces was obtained. The steel maker reported as follows with regard to the last batch of steel: (a) There was a tendency for the plates to warp. (b) The plates which cracked showed a coarse fracture. No normalizing or other treatment was employed prior to hardening. (c) In several cases the fractures showed slight longitudinal cracks. Whether these were connected with defects along the plates or with the tool marks was not determined. (d) A bend test on a broken piece which, however, had been given the full treatment, did not show as much ductility as was expected.

Bus Fittings De Luxe



The above illustration shows an interior view of the Yankee Clipper coach body manufactured by the Fitzjohn Mfg. Co. of Muskegon, Mich. The upholstery is in Chase emerald-green figured Moravia mohair. The seat cushions are 20 in. wide and are provided with folding arm rests. It is claimed that mohair has the property of absorbing a large portion of the high-pitched noises that tend to fatigue passengers on long trips, and that the green color employed is restful to the eye, hence the style of upholstery is particularly conducive to comfort.



NEWS

OF THE INDUSTRY



June Output Below Average

Estimated at 254,760
Units by N.A.C.C.

NEW YORK, July 9—Production of motor vehicles in United States and Canadian factories during the month of June reached 254,760 units, according to the monthly estimate of the National Automobile Chamber of Commerce, released today. This figure represents a drop of 22 per cent from May production, and a drop of 27 per cent from production during the month of June a year ago. Last year's seasonal May-June decline was 21 per cent.

Production of motor vehicles for the first six months of this year is estimated at 1,632,971, 29 per cent below the figure for the corresponding period of last year, and 39 per cent below the five-year average for the period. June production was 39 per cent under the five-year average for June.

Wetherald Succeeds Barth at Chevrolet

DETROIT, July 6—C. E. Wetherald has been appointed general manufacturing manager of Chevrolet Motor Car Co., succeeding Charles F. Barth, who resigned June 30. Mr. Wetherald was assistant general manufacturing manager, previous to which he was factory manager. F. O. Tanner, formerly in charge of manufacturing operations in Detroit and Toledo, was appointed assistant general manufacturing manager of Chevrolet, with headquarters in Flint. Hugh Dean, formerly manager of the Detroit forge, spring and bumper plants, has been placed in general charge of Detroit factories of Chevrolet.

Nash Earnings Gain

NEW YORK, July 9—Nash Motors Co. reports earnings for the quarter ended May 31 of \$1,260,574, or 46 cents a share.

ANNE FULLER MATHESON, daughter of C. W. Matheson, gen. s. m. Graham-Paige, was married June 27 to David H. Hinchman * * * E. L. Mills has been elected vice-president of the Bastian-Blessing Co., welding equipment makers * * * the rest of this is contributed by Edwin McK. Johnson, our Chicago correspondent, who is a consistent supporter of the column. Judging by the number of whimsies he sends in you'd think all that sort of thing happened around Chicago * * * Excavation work completed, caissons are being sunk for the twenty-nine-story skyscraper which is to be the home of the Motorists Association at Michigan Avenue and 24th Street * * * Indictments have been returned against twelve persons accused of conspiring to wreck a motor bus plying between Chicago and St. Louis. The driver and nine of the others were in the bus when it plunged into a shallow ditch. Damage was slight but the "passengers," who, it is alleged, made the trip in order to file claims after the "accident," asked the company for \$30,000 * * * Pete Alberts of St. Louis, Mo., took honors in the Fourth of July race program staged here, winning the five-mile and 15-mile races and a total of \$460. Albert drove the 15 miles in 14 minutes, 41 seconds. He won the five-mile event in four minutes, fifty seconds * * * Mrs. Mary Harney, of Marion, Indiana, was awarded \$285.45 recently for damages caused to her automobile following a collision with a quail. Mrs. Harney's car was insured against collision with a vehicle or an animal and she stated she lost control of the machine when a quail flew against the windshield * * * The week of July 20 will see safety lanes set up all over Chicago for testing cars for mechanical deficiencies * * * Taxicab companies, among the first to feel the depression, have enjoyed a steady increase in business during the last two months, W. W. Cloud, president, National Association of taxicab owners, pointed out at that organization's convention here recently * * * Mayor Cermak, who is swinging the economy axe in Chicago, recommends that the three fire boats, now powered with steam, be equipped with Diesel engines. They now have an annual coal bill of \$20,000, because steam is always kept up. Mayor Tony says Diesels will be cheaper and easier to handle * * * Nash declared a dividend of a \$1 following its earnings statement which appears elsewhere in the news section of this issue * * * Allen D. Gutchess, president of the DeVilbiss Co., Toledo, has just returned from a business and pleasure trip to Europe * * * The Aeronautics branch of the Commerce Department has just completed its survey of aircraft, engine and equipment production in 1930, and reports that the total output of these items pertaining to the aircraft industry was valued at \$61,211,197 for the year.—H. H.

Wayne Sales Drop in June

Ford Registrations
Were Leading Chevrolet

DETROIT, July 8—Registrations in Wayne County during June were 6003, a decrease of 1425 or 19 per cent from total of 7428 for June, 1930, and a decrease of 980 or 14 per cent from the total of 6983 for May. Total registrations to date this year are 30,472 against 44,122 for the same period last year. Ford registrations, totaling 2383 were down 17 per cent from May and down 50 per cent from June, 1930, total. Chevrolet registrations were 1531 against 1800 in May and showed an increase of 47 per cent over registrations for June last year.

Essex is third with 253; Plymouth fourth with 196; Buick fifth with 192, and Pontiac sixth with 190. Those companies showing increases over June, 1930, follow: Auburn, Buick, Chevrolet, Chrysler, De Soto, Dodge, Essex, Hudson, Lincoln, Marmon, Oldsmobile, Pontiac and Willys.

Commercial car registrations during June were 508 against 559 for May and 480 for June last year. Ford was first with 359, Chevrolet second with 85 and G. M. C. third with a total of 20.

Reo Names Holmes

DETROIT, July 8—Reo Motor Car Co. announces appointment of Milton Holmes as general truck sales manager. Mr. Holmes entered the truck field in 1915, as general sales manager of the Republic Truck Co. Afterwards he became president of the Transport Motor Truck Co. Then reorganized the Commerce Motor Truck Co. for Bassick Brothers. When Relay and Garford merged he left and became general sales manager of the Federal Motor Truck Co. Recently he has been West Coast regional manager for Reo.

THE
NEWS
TRAILER

Auburn Earns \$11.06 In Quarter

Figures for March to May Period Exceed Previous Record

CHICAGO, July 8—Auburn Automobile Co. and its subsidiaries for the months of March, April and May, comprising the second quarter of the current fiscal year ended May 31, earned consolidated net profits of \$2,158,764.98, equal to \$11.06 a share on 195,234 shares outstanding on that date.

This compares with net profits of \$769,385, equal to \$3.94 a share, for the like period of 1930, and compares with \$1,312,934, equal to \$6.75 a share, for the like period in 1929, based on the present capitalization.

For the first six months ended May 31, 1931, consolidated net profits were \$2,361,175, equal to \$12.09 per share, as compared to \$866,009, equal to \$4.44 a share in 1930, and compares to net profits of \$1,827,507, equal to \$9.36 a share, in the first six months of 1929.

The consolidated balance sheet of the company, and its subsidiaries, as of May 31, 1931, shows current assets of \$16,235,898, of which \$6,698,642 are in cash and government securities. Current liabilities amount to \$4,460,378, giving a net current ratio of 3.64.

Net quick assets per share amount to \$60.31, and book value per share \$85.40.

E. L. Cord, chairman of the board, in a brief statement, said: "Even more important and gratifying than the improvement in financial condition of the company itself, over like periods in the past, has been the advance of the company from twenty-second place a year ago to an established position well within the first ten producers in the industry, in May of this year."

Graham Sells Branch

DETROIT, July 7—C. W. Matheson, general sales manager of Graham-Paige Motors Corp., has announced that Reeve Gartzmann, Ltd., Los Angeles, Calif., has purchased the Graham-Paige Co. of Southern California, operated as a factory branch for more than a decade.

Reeve Gartzmann is president of the company, and H. E. Franklin vice-president and general manager.

Reeve Gartzmann, Ltd., has taken over the Graham factory branch building at Twenty-third and Figueroa, especially erected ten years ago.

Plans Service to Legislators

NEW YORK, July 6—The Society of Automotive Engineers will contact with the National Automobile Cham-

ber of Commerce relative to possible coordination between the organizations in furnishing legislators with technical and engineering information on proposed bills to regulate automotive equipment.

Members of the council hold that the society could properly offer technical advice without becoming involved in the political aspects of various problems.

Thousands of bills seeking to regulate operation and design of motor vehicles are pending in congress and state legislatures.

Frank Nutt

A brief notice of the death of Frank Nutt, research engineer of the AC Spark Plug Co., appeared in our issue of June 27. Mr. Nutt was born near Chicago on Oct. 17, 1880, and was therefore only 51 years old at the time of his death. He had been connected with the automobile industry practically since leaving school, having joined the Haynes-Apperson Co., Kokomo, Ind., in 1899. He first held several positions in the production department, but in 1903 joined the sales department of the company.

In 1906 he became assistant chief engineer and in 1910 chief engineer of the company. During the early years of his connection with the Haynes company he drove its cars in races and endurance contests; he had attended national automobile shows regularly since 1903, and he took an interest in the work of the S.A.E. and repeatedly took part in its technical discussions.

Before coming to the AC Spark Plug Co. in 1924, Mr. Nutt had rounded out a quarter of a century with the Haynes company. At AC he had charge of the development of new devices and of patent work for some time prior to his death. In addition to his development work in the automobile and accessories lines, Mr. Nutt devoted considerable time to outboard engines.

To Attend Air Races

CLEVELAND, July 11—Three foreign nations have officially accepted invitations to participate in the 1931 National Air Races here Aug. 29 to Sept. 7, according to cablegrams from Lieut. Alford J. Williams. They are England, Italy and Czecho-Slovakia.

Germany, France, Spain and Poland are to be visited by Lieut. Williams, who was sent abroad by the Standard Oil Company of Ohio, with formal invitations from Gov. George White of Ohio, and air race officials for leading foreign aviators to come to the 1931 air classic.

Buick Produces 6479

DETROIT, July 7—Buick Motor Company has reported June production amounting to 6479 against 9256 in May and 4135 in June, 1930.

May Shipments of Tires Gained

Increase Was Above Normal Seasonal Expectation for Month

NEW YORK, July 8—Shipments of pneumatic casings during May showed an increase over April of 9.8 per cent, as compared with a normal seasonal increase for the month of 3 per cent, according to the Rubber Manufacturers' Association. Total shipments for the month were 5,415,171, and are 3.8 per cent above the figure for the corresponding month of last year.

Production during the month amounted to 5,678,754 units, an increase of 14.9 per cent over April, and being almost on a par with production for the corresponding month of last year. Inventories as of May 31 were 10,312,320, a decrease of 23.2 per cent from the corresponding date of last year, and 2.8 per cent above those of April 30 of this year. Comparative figures follow:

	Ship-ments	Produc-tion	Inven-tory
May 31 ...	5,415,171	5,678,754	10,312,320
Apr. 31....	4,931,906	4,944,363	10,031,419
May 30...	5,216,471	5,717,369	13,431,736

Graham Canadian Line in Production

WALKERVILLE, ONT., July 7—Completion of the first Canadian built Graham car at the new Graham factory in Walkerville was achieved July 1, according to an announcement.

Members of Parliament and the Provincial Assembly, Mayors of the five Border Cities, Graham executives, and many of the leading Graham distributors and dealers in Canada were present at the ceremonies at the end of the assembly line in the new plant. A telegram of congratulation from Premier Bennett was read by Dr. R. D. Morand, M. P.

Petroleum Imports Rise

NEW YORK, July 8—Imports of petroleum during the week ending July 4 averaged 272,857 barrels per day, according to the American Petroleum Institute. This compares with a daily average of 154,714 for the preceding week and with a daily average of 212,800 barrels during the month of June and 200,065 barrels daily for the month of May.

Crude runs to stills during the week averaged 2,324,700 barrels a day. There was manufactured during the week 3,089,000 barrels of cracked gasoline, according to reports received.

Fruehauf Names Agency

DETROIT, July 7—Fecheimer, Frank and Spedden, Inc., advertising agency have been appointed as advertising counsel by Fruehauf Trailer Co.

Metal Markets Position Firmer

Seasonal Influences
Dominate Steel
Situation, is View

By William Crawford Hirsch

NEW YORK, July 9—What tonic effect on the metal markets could be looked for from consummation of the reparations holiday pact at Paris had to a considerable extent been anticipated when announcement of the impending move first came from Washington.

Non-ferrous metal values were perhaps fortified, but hardly altered by the week's developments. In the steel market seasonal influences were to the fore. Holiday shut-downs of the plants of some consumers were offset by suspended operations at a number of steel mills. The effect of high temperatures also made itself felt in the output. Compared with other steel products, sheets make a very fair showing.

A good deal of business was placed on the eve of the change in nomenclature and price list. This will go far toward bridging the gap in buying that must be looked for between now and the time when preparations for fall schedules get under way. A good deal of black sheet business was booked at the old 2.15 cents, Pittsburgh, price for shipment throughout July, buyers being told that this grade, now designated as hot-rolled annealed sheets, would positively carry a 2.40 cents, Pittsburgh, price on all shipments made after Aug. 1.

The advance in hot-rolled strip prices to 1.65 cents, Pittsburgh, on 6-inch and under and to 1.55 cents on 6 to 24 inch is now in effect, but large consumers were covered for July shipments at the old and \$1 per ton lower prices. Operation of strip mills is at the lowest rate of the year. Demand for automotive alloy steels is running very light.

Pig Iron—Interest in offerings on the part of automotive foundries is largely in abeyance. Lake furnaces continue to quote \$17 @ \$17.50 for Michigan delivery. Cleveland furnaces quote \$17, furnace, in local transactions. The same level prevails for No. 2 foundry and malleable in the Valley market.

Aluminum—Quiet and unchanged.

Copper—There is talk of further curtailment of production but the week's opening found the market in a rather tame state with 8¼ cents, delivered Connecticut, and 8½ cents, delivered Middle West, the prevailing quotation. Wire drawers and copper and brass products fabricators are basing their prices on a 9-cent price for the metal.

Tin—Dull. Spot Straits was quoted at 26-38 cents at the week's opening.

Lead—Quiet and unchanged.

Zinc—Steady and unchanged.

Americans in Paris Salon

PARIS, June 25 (by mail)—The first of the series of European shows, the Paris Salon, to be held in the Grand Palais, will run from October 1 to 11 inclusive. Twenty American manu-

facturers of passenger cars have secured booths on the ground floor, namely Ford, Lincoln, Chrysler, Willys-Overland, Willys-Knight, Packard, Reo, Dodge, Hudson, Essex, Pierce-Arrow, Studebaker, Franklin, Graham-Paige, Duesenberg, Hupmobile, Nash, De Soto, Auburn, and Cord. There are five English makes, six German or Austrian, and four Italians.

In the same hall from November 28 to December 6 there will be a truck show, in which the only foreign exhibitors are Ford, Pierce-Arrow and Dodge. As last year, General Motors has declined to take space in the Paris show.

George Eugene Sly Dies

George Eugene Sly died suddenly in St. Charles, Mo., on Tuesday morning, July 7. Funeral was to be held in his boyhood home, Fredonia, N. Y., at 3.30 Thursday afternoon.

Mr. Sly was 60 years old. He started



George E. Sly

his publishing career as a representative of the "Grape Belt," a local paper published at Dunkirk, N. Y.

In 1894 he joined H. M. Swetland of New York. For two years he sold subscriptions on "Power," and in 1896 joined the advertising department.

In 1899 "Power" was sold to John Hill, and Mr. Sly continued with that publication under the new management until 1905, when the Swetland Publishing Co. was formed, and he and Mr. Swetland published the "American Architect" and the "Municipal Journal and Engineer."

In 1908 he purchased the "American Architect," and in 1915 he sold the publication to the United Publishers Corp. From that time until 1924 he continued with the United Publishers Corp. as a director, and spent most of his time in promoting the interests of the Class Journal Co.

Mr. Sly retired from active business in 1924. His home is in Ashville. He leaves a widow, Mrs. Beulah Sly, and a brother, Fred Sly, who is prominently connected with the National Trade Journals.

Ohio Employment Off 4 Per Cent

June Figure Shows Loss
From May and is 11 Per
Cent Below Last Year

COLUMBUS, OHIO, July 7—The Bureau of Business Research of Ohio State University in a bulletin covering employment in the automobile and automotive parts industries in Ohio shows that June employment was 4 per cent lower than in May this year and 11 per cent less than in June of last year. Of the 51 concerns reporting 16 showed increases, 32 reported decreases and 3 indicated no change in June employment, as compared with May. The usual seasonal decline in June over May is 4 per cent and thus the records are not unfavorable. Average employment in the industries for the first half of 1931 was 15 per cent less than for the corresponding period last year.

Employment in the tire and tube factories in Ohio during June showed an increase of 1 per cent over May figures which compares favorably with the five-year seasonal stability for the May-to-June period. June employment, however, was 24 per cent less than that of June, 1930. Of the 12 concerns reporting, six contributed to the increase, five showed decreases and one indicated no change in June compared with May. Average employment for the first half of the year was 26 per cent less than during the corresponding period last year.

Klein's Talk Available

WASHINGTON, July 7—The Department of Commerce has announced that mimeographed copies of Dr. Julius Klein's weekly radio talks over the Columbia Broadcasting System may be obtained on request to the department. Persons desiring to receive them regularly may be placed on a special mailing list for this purpose.

Kelley Heads Toledo Chamber of Commerce

Dan H. Kelly, executive vice-president of Electric Auto-Lite Co., is the new president of the Toledo Chamber of Commerce.

Allis Orders Off

CHICAGO, July 6—Unfilled orders of Allis-Chalmers Mfg. Co. on July 1 totaled \$9,051,000, compared with \$9,776,000 June 1 and \$17,926,000 July 1, 1930.

Hurd Lock Incorporates

DETROIT, July 7—The Hurd Lock Co. has been incorporated here. E. P. Hurd is president, P. W. Mulder is vice-president, and C. D. Ferguson is treasurer and secretary.

G. M. June Sales Ahead of 1930

Those to Consumers and Dealers Both Exceed Corresponding Month

NEW YORK, July 8—For the first time this year, monthly sales of General Motors cars to consumers exceeded those of the corresponding month of last year. Sales in June were 103,303 as compared with 97,318 in June of last year, and with 122,717 in May of this year.

Sales to dealers by divisions of General Motors, both within the United States and throughout the world, also exceeded those of the corresponding month of last year for the first time. Sales to United States dealers amounted to 100,270 as compared with 87,595 in June of last year and with 136,778 in May of this year. Sales to dealers throughout the world were 111,668 as compared with 97,440 last year, and with 153,730 in May of this year.

Six months sales to consumers totaled 593,564 as compared with 657,829 for the first six months of last year. Six months' sales to dealers in the United States were 625,674 as compared with 679,572 for the corresponding period of last year, and sales during the period to dealers throughout the world were 724,197, as compared with 764,219 a year ago.

General Motors Corporation has adopted a new policy with regard to the announcement of its sales figures, and hereafter will make them public on the 8th of the month for the month immediately preceding. Heretofore, these figures have usually been announced some time after the 15th of the month.

Cadillac Widens Service

DETROIT, July 6—The Cadillac Motor Car Co., through all Cadillac factory branches, is making it possible for Cadillac owners to have their cars called for and delivered when service operations are desired. The company has purchased a fleet of Indian Dispatch-Tow motorcycles, with a special attachment which permits the cycle to be towed behind the car to be serviced. The serviceman uses the motorcycle to collect the car, and tows the cycle back to the shop. The service will be put on a national basis with the cooperation of Cadillac dealers in most metropolitan centers.

Motor Stocks Appreciate

NEW YORK, July 6—Stocks in automobile manufacturing companies increased in market valuation 14 per cent during June, according to statistics compiled by Frazier Jelke & Co. This figure is based on an analysis of seven representative companies

July 11, 1931

Resume of General Motors Sales

Sales to Consumers in United States

	1931	1930	1929	1928
January	61,566	74,167	73,989	80,582
February	68,976	88,742	110,148	107,014
March	101,339	123,781	166,942	155,973
April	135,663	142,004	173,201	170,544
May	122,717	131,817	169,034	186,892
June	103,303	97,318	154,437	174,085
July .....	.....	80,147	147,079	142,515
August .....	.....	86,426	151,722	151,105
September .....	.....	75,805	124,723	118,113
October .....	.....	57,757	114,408	109,789
November .....	.....	41,757	68,893	70,414
December .....	.....	57,989	44,216	25,435
Total .....	.....	1,057,710	1,498,792	1,492,461

Sales to Dealers in United States

	1931	1930	1929	1928
January	76,681	94,458	95,441	96,845
February	80,373	110,904	141,222	141,642
March	98,943	118,081	176,510	168,107
April	132,629	132,365	176,634	161,720
May	136,778	136,169	175,873	170,388
June	100,270	87,595	163,704	154,912
July .....	.....	70,716	157,111	135,412
August .....	.....	76,140	147,351	149,781
September .....	.....	69,901	127,220	136,870
October .....	.....	22,924	98,559	91,428
November .....	.....	48,155	39,745	27,672
December .....	.....	68,252	36,482	27,779
Total .....	.....	1,035,660	1,535,852	1,462,556

Total Sales to Dealers in U. S. and Canada Plus Overseas Shipments

	1931	1930	1929	1928
January	89,349	106,509	127,580	125,181
February	96,003	126,196	175,148	169,232
March	119,195	135,930	220,391	197,821
April	154,252	150,661	227,718	197,597
May	153,730	147,483	220,277	207,325
June	111,668	97,440	200,754	186,160
July .....	.....	79,976	189,428	169,473
August .....	.....	85,610	168,185	186,653
September .....	.....	78,792	146,483	167,460
October .....	.....	28,253	122,104	120,876
November .....	.....	57,257	60,977	47,587
December .....	.....	80,008	40,222	35,441
Total .....	.....	1,057,710	1,498,792	1,492,461

Unit sales of Chevrolet, Pontiac, Oldsmobile, Oakland, Buick, LaSalle and Cadillac passenger and commercial cars are included in the above figures.

and is a fair average for the entire list of stocks which showed a recovery of 14.1 per cent during the month, based on the experience of 100 representative stocks in selected groups.

Between Aug. 30, 1929, and June 2 of this year, the motor stocks had dropped 63.9 per cent. This increase of 14 per cent is the first marked advance during that period.

American Cable Low Bidder

NEW YORK, July 6—American Cable Co., subsidiary of the American Chain Co., was the lowest bidder for the contract for construction of cables and accessories for the Golden Gate Bridge which is to be built between Oakland and San Francisco, Calif. The American Cable Co. bid was \$6,255,767.

Austin Adds Type

NEW YORK, July 6—The American Austin Car Co. has announced the addition of a ¼-ton, pick-up delivery, priced at \$325, f.o.b. Butler, Pa., to its available line. The car will carry packages measuring up to 34 in. by 45 in., weighing 400 lb.

Curtiss Gets Navy Order

NEW YORK, July 8—Curtiss Aeroplane & Motors Co. has been awarded a contract from the U. S. Navy for 30 airplanes of the Helldiver type. The total amounted to \$443,235.

These airplanes are of the two seater observation type designated by the Navy as the O2C-1 and are powered with R-1340 engines developing 450 hp.

Special features of the airplane include fuel capacity of 120 gallons, which is greater than the normal fuel load of the previous Navy observation type, a rear cockpit designed especially for the protection of the gunner in any position and steerable tail wheel. Engines are cowled with the new Curtiss anti-drag ring.

Hudson Sales Increase

DETROIT, July 7—Sales of Hudson and Essex cars for the week ending July 4, showed an increase of 42 per cent over the same period a year ago, according to William J. McAneeny, president and general manager. This also represented a 12 per cent increase over the previous week.

Automotive Industries

J. B. Walker Dies; Headed N.A.A.M.

One-time Magazine Publisher Manufactured Mobile Steam Car

John Brisben Walker, one of the pioneer manufacturers of steam automobiles and perhaps best known as one-time publisher of the *Cosmopolitan Magazine*, died at Brooklyn, N. Y., on July 7, aged 84. Mr. Walker, in partnership with Amzi Lorenzo Barber, asphalt magnate, in 1898 bought from the Stanley Brothers of Newton, Mass., the rights to the manufacture of a small steam passenger car which the Stanleys had developed and on which they had started production in Newton. It was reported at the time that the deal, which also covered the services of the Stanley Brothers for a period of one year, involved a cash consideration of a quarter of a million dollars.

Barber and Walker divided their interests in the steam car and both started to build substantially identical cars, the first at Bridgeport, Conn. (the Locomobile), and the latter at Tarrytown, N. Y. (the Mobile). The Mobile was turned out for a number of years in limited numbers in the plant, which became the nucleus of the present Chevrolet assembling plant in Tarrytown. The Mobile Co. of America, of which Walker was the head, also produced a number of steam buses before it was wound up.

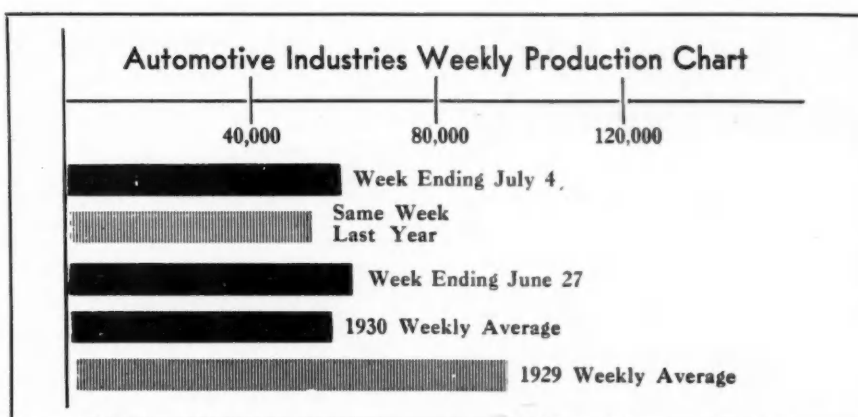
In 1896, when the automobile was in its earliest stage of development in this country, Mr. Walker offered prizes of \$3,000, known as the *Cosmopolitan* prize, for an automobile race from New York City to Irvington-on-the-Hudson, a distance of about 20 miles. Later on, when the National Association of Automobile Manufacturers was organized, he became its first president.

Changes Meeting Date

NEW YORK, July 6—The Society of Automotive Engineers has advanced the date for its National Transportation Meeting to be held in Washington, from Nov. 10 to 12, inclusive, to Oct. 27 to 29, inclusive. This meeting will be held at the Shoreham Hotel. The reason for this change was to avoid conflicting with the annual meeting of the American Petroleum Institute to be held in Chicago on Nov. 10 to 12, inasmuch as the meetings of both national organizations will be largely attended by the same groups of motor vehicle fleet operation representatives.

Edward G. Acheson

Edward G. Acheson, inventor of the abrasive silicon carbide (carborundum) and of a process for making graphite in a very finely divided (de-



floculated) form for use as a lubricant, besides many other products of electro-thermal processes, died at New York on July 6, aged 75. Mr. Acheson was associated with Edison during the early days of electrical development. He first produced silicon-carbide in 1890, and the Carborundum Company was organized to manufacture the new product at Monongahela, Pa., in 1891. Four years later it moved to Niagara Falls, N. Y., where cheap power was available for the manufacturing process.

Ero Leases Building

CHICAGO, July 6—In anticipation of improvement in the automotive accessories industry, Ero Mfg. Co. has leased a seven-story and basement building at 714-718 West Monroe Street. The lease was the biggest industrial lease recorded so far this year in Chicago. The company will move from 2234 Ogden Avenue, the present site, August 1. In the new structure the space of the firm is doubled. During the firm's existence, 20 years, it has moved four times, each time doubling its floor space.

Rusco Sales Increase

MIDDLETOWN, CONN., July 7—For the period from March 25 to June 10 there was an increase of 47.5 per cent over the previous 12-week period in the replacement sales of Rusco brake linings to motorists, according to announcement by W. T. Palmer, manager of the replacements department of the Russell Manufacturing Co.

Chrysler Adds D.L. Coupe

DETROIT, July 7—A five-passenger coupe was announced today as an addition to the new Chrysler de luxe eight line of passenger cars.

The new body style is priced at \$1,565 f.o.b. Detroit, the same price as the de luxe sedan.

Nash Ships 6815

NEW YORK, July 6—Nash Motor Co. shipped 6815 new cars for the month of June and entered July with unfilled June orders amounting to 1939.

De Soto Offers Free Wheeling

DETROIT, July 12—The addition of "perfected" free wheeling as optional equipment at \$20 extra on both De Soto six and eight-cylinder cars is announced today by De Soto Motor Corp.

The De Soto free-wheeling unit was developed by Chrysler engineers, the announcement states.

This device permits free wheeling in all forward speeds.

The driver may free wheel or not by means of a button conveniently located below the dash and to the immediate right of the steering column bracket. When the button, which is similar to that of the choke, is pushed in the transmission is in free-wheeling position. When the button is pulled out, the conventional shift is employed.

One of the improvements noticeable on the De Soto free-wheeling unit is that it is unnecessary to touch the button when shifting into reverse gear. The free-wheeling device is automatically disengaged while the gears are in reverse and automatically return to free-wheeling position when the gears are again in a forward speed. The new transmission is of the constant-mesh type.

Cadillac Ships 1409

DETROIT, July 8—Cadillac-LaSalle shipments in June totaled 1409 units, an increase of 39 per cent over the number of cars shipped in the same month last year.

Total shipments for the first half of 1931 amount to 10,981 Cadillacs and LaSalle's, which is nine per cent more than the total number of cars shipped in the first half of 1930.

June's figures bring the second quarter of this year 5793, which is slightly ahead of the 5762 cars shipped in the second quarter of 1930, and which is 11 per cent greater than the first quarter of this year, when 5188 units were shipped.

April was the biggest month, with 2607 shipments. March was second, with 2332. Each month this year, with the exception of May, has shown an increase over the corresponding month of last year.

Men of the Industry and What They Are Doing

A.S.T.M. Meets in Chicago

Graham Leaves Willys

TOLEDO, July 7—George M. Graham has resigned as vice-president in charge of sales of the Willys-Overland Co. to accept another position. This was confirmed here by L. A. Miller, president of the company. The resignation becomes effective July 11. President Miller said no successor to Mr. Graham would be named, but the sales duties carried out by N. A. Beardsley, Eastern sales manager and Perry Gartley, Western sales manager, with the present sales organization.

Mr. Graham has held his present position about four years and just completed a term as president of the Toledo Chamber of Commerce.

Named on Committee

Roy D. Chapin, chairman of the board of Hudson; Lamont du Pont, chairman of the board of General Motors Corp.; and J. D. Mooney, president, General Motors Export Co., have been named as members of a new American committee which will direct American participation in the affairs of the International Chamber of Commerce during the next two years.

The committee is headed by Silas H. Strawn, president of the U. S. Chamber of Commerce, and includes in its personnel sixty-three of the most prominent business, industrial and financial leaders of the country.

G.A.C. Names Thaden

The General Aviation Corp. has appointed H. V. Thaden as acting chief engineer and general manager of the Fokker Aircraft Company's manufacturing division. Mr. Thaden, who formerly headed the Metal Aircraft Corp. of Pittsburgh, succeeds A. A. Gassner, who has been in charge of the Fokker plant for several years.

McVicker Leaves Moline

W. J. McVicker announces that his contract with the Minneapolis-Moline Power Implement Co. expired, as of June 30, and that he will devote his time henceforth to the partnership of W. J. McVicker & Sons, Minneapolis. Mr. McVicker is a specialist in the design of automotive agricultural and industrial machinery.

Brosseau Article Published

A. J. Brosseau, president of the Mack Trucks and vice-president of the National Automobile Chamber of Commerce, has prepared an article appearing in the July issue of the "National Sphere" showing that motor

transport is a national asset. Mr. Brosseau indicates that there is a need for a thorough study of rail motor coordination by railroad managements in cooperation with the shipping public.

The article refuted charges that the truck and bus competition is unfair, and stated that there is nothing to stop the railroads from going into the trucking business if they so desire.

Zollinger Recuperating

Frank T. Zollinger, treasurer of Chassis Lubricating Co., Rahway, N. J., is at present recuperating in the Harper Hospital, Detroit, from a serious operation. Latest reports are that he is progressing well onto the road of health.

Binder and Pessel Sail

Richard L. Binder, president of the Metals Coating Co. of America, Philadelphia, sailed for Europe July 7. He was accompanied by Dr. Leopold Pessel, chemist and metallurgist of the company.

J. F. Mauro Sails

John F. Mauro, district supervisor of Hupmobile sales in Europe, has sailed from New York. Central Europe has been added to his present territory comprised of Mediterranean countries.

Buick Sales Are Third

FLINT, MICH., July 11—Registration figures for the first 5 months of the year, January to May, inclusive, show Buick holding third place for the entire country among all cars. Buick's five months' registrations amounted to 45,935 units, two makes of cars occupying the low-price field alone exceeding this figure.

Analysis of Buick sales by models shows a demand for the 8-50 series, which is the lowest priced model Buick has produced in many years. For the five months, registrations of this series amounted to 18,689. The 8-60 shows 12,812 registrations and the two larger cars, the 8-80 and 8-90, 14,434 combined.

Snap Spokes Sell Well

NEW YORK, July 6—Budd Wheel Co. has reported consistent gains in the distribution of its stainless steel snap spokes.

Borg & Beck Orders Gain

CHICAGO, July 8—Borg & Beck Co. showed an increase of 66 per cent in unfilled clutch orders during June, compared with the same month in 1930.

Registration Sets New Record; Exhibits Draw Attention

No less than 1500 registered at the annual meeting of the American Society for Testing Materials, which came to an end at Chicago on June 26. A new feature of this meeting was an exhibit of testing materials in which 34 exhibitors of testing materials participated.

An innovation of the meeting was that at the afternoon and evening sessions devoted to a symposium on "Effects of Temperature on the Properties of Metals," none of the papers were presented by the authors; instead, these papers were summarized by L. W. Spring, chief chemist, Crane Co., and H. J. French, metallurgical engineer, International Nickel Co., respectively. This procedure assured sufficient time for discussion.

A symposium on "Abrasion Testing of Rubber" drew a large group of rubber technologists, while a symposium on "Weathering Characteristics of Materials" brought out a number of pertinent facts and observations on masonry deterioration.

A joint session with the Western Society of Engineers was held on Thursday evening and was devoted to a discussion of the "Economic Significance of Specifications for Materials." The general consensus of opinion was that while great progress has been made in specification writing by such organizations as the A.S.T.M., much remains to be done, and the sooner it is done, the greater will be the savings in construction and manufacturing costs.

A symposium on "Malleable Iron Castings" occupied most of the joint session with the American Foundrymen's Association, held on Friday. It was intended to bring together in concise form, authoritative and critical data on the properties of malleable iron castings. Valuable data and material were brought together of which little use has been made heretofore because of lack of dissemination.

Libbey Plans Note Issue

TOLEDO, July 7—Libbey-Owens Ford Glass Co. will issue \$9,000,000 five per cent gold notes convertible into common stock at \$25 a share to pay for two plants acquired from the National Plate Glass Company, a General Motors subsidiary. General Motors will subscribe to \$3,500,000 of the notes at par and accrued interest. Remainder have been underwritten by large interests in the company, but will be offered to stockholders under a subscription plan.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, July 8—Negotiations between the United States and France regarding President Hoover's proposal for a moratorium on debt payments of the important creditor nations continued as the most important factor in business sentiment last week. The hope that this proposal would be carried out had the effect of slightly improving the outlook in some business quarters. Retail trade was improved somewhat by the hot weather and preparations for the holiday. It is still evident, however, that the cheap and moderate-priced goods are most readily purchased. There was a very slight improvement in wholesale and jobbing lines, but most orders were for small lots.

DEPARTMENT STORE TRADE

Department store trade in the New York Federal Reserve District during May, according to the Federal Reserve Bank of New York, was 15 per cent below that a year ago; chain store sales were 5 per cent below, and wholesale trade was 21 per cent below.

COMMERCIAL FAILURES

Commercial failures during June, according to R. G. Dun & Co., numbered 1993, as against 2248 during the preceding month and 2026 a year ago. Liabilities involved in the June failures totaled \$51,655,648, as against \$63,130,762 a year ago. The number of failures during the first half of this year is the highest on record.

CAR LOADINGS

Railway freight loadings during the week ended June 20 totaled 739,116 cars, which marks an increase of 6663 cars above those during the preceding week, but a decrease of 181,529 cars below those a year ago and a decrease of 330,758 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended July 4 stood at 70.6, as against 70.3 the week before and 70.0 two weeks before.

STOCK MARKET

Activity on the stock market last week was considerably below that in the preceding week. The uncertainty of the outcome of the negotiations with France regarding the debt moratorium was the basis for more or less irregularity.

BROKERS' LOANS

Brokers' loans in New York City during the week ended July 1 increased \$73,600,000. This increase follows ten consecutive weeks of decline, which aggregated \$443,000,000.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended July 1 showed an increase of \$45,000,000 in holdings of Government securities, while there were decreases of \$48,000,000 in holdings of discounted bills and of \$3,000,000 in holdings of bills bought in the open market. The reserve ratio on July 4 stood at 84.4 per cent, as against 84.1 per cent the week before and 85.2 per cent two weeks before.

Bakelite Building Plants

NEW YORK, July 6—Bakelite Corp. is erecting a new plant at Bound Brook, N. J., which is now nearing completion. The main building of the new plant is of steel and brick construction 400 ft. square by 90 ft. high.

There are five additional large buildings of similar construction, which will be used for manufacturing purposes, and nine auxiliary buildings, including the boiler plant, machine plant and power house. There will also be the requisite storage tank and storage space for liquid and solid materials.

French Aero Budget Up

WASHINGTON, July 6—The French air budget for the fiscal year 1931-32 is over \$7,000,000 larger than that of last year, according to a report received in the Commerce Department from assistant trade commissioner H. S. Schuette at Paris. The total sum appropriated for the 1931-32 fiscal year amounts to approximately \$86,428,000.

The most important item from the standpoint of commercial aviation is \$7,683,200, the same as that for the preceding year, for commercial air line subsidies.

Vauxhall Shows Loss

LONDON, June 26 (by mail)—The report and accounts for 1930 of Vauxhall Motors, Ltd., the English subsidiary of General Motors Corp., were issued today and show a net loss of £88,536 on the year, which compares with a loss of £283,791 in 1929; in both cases after liberal allowances for depreciation. The company operated during the last eight months with practically no loss, it was stated.

Proposes Rating Method

NEW YORK, July 6—C. A. Peirce, vice-president in charge of Engineering and Production of the Diamond T Motor Car Co., has proposed that the problem of truck rating might be solved by specifying speeds in relation to gross weight. Some states already have such laws, Mr. Peirce points out, but there is lack of uniformity in the country in this respect.

Win French Grand Prix

PARIS, June 22 (by mail)—Covering a distance of 782.1 miles, Louis Chiron and Achille Varzi won the French 10-hour Grand Prix, on Montlhéry track, Sunday, at the wheel of a 140 cu. in. supercharged straight eight Bugatti.

Introduces Eveready Rustone

NEW YORK, July 9—The National Carbon Co., Inc., announces an Eveready Rustone product which is claimed to prevent rusting of automobile cooling systems.

Develops Service Tank

NEW YORK, July 6—Chassis Lubricating Co., Rahway, N. J., has now placed on the market a new service tank for easy handling of the lubricant in use for chassis.

Lawrence Returns; View is Favorable

European Representative of N. A. C. C. Cites Highway Program

NEW YORK, July 6—There is a growing appreciation of the advantages of motor transportation throughout the whole of Europe, according to John V. Lawrence, European representative of the National Automobile Chamber of Commerce, who returned last week aboard the S.S. Albert Ballin. European railroads have shown a marked diminution in the opposition to highway transportation and are increasingly willing to supplement their facilities with bus and truck equipment. The misunderstanding of European countries following the enactment of the tariff law in the United States is gradually disappearing and with it the attempt of foreign governments to retaliate.

Further expansion of world markets is expected to result for a unified program of education being carried on by the International Permanent Bureau of Automotive Manufacturers, in which organization the National Automobile Chamber of Commerce and similar bodies in other automotive producing companies are represented. Functioning as an automotive league of nations, this organization has undertaken to develop world markets for motor vehicles irrespective of the country of origin.

Mr. Lawrence has spent the past 18 months in studying conditions in Europe and assisting in the development of highway transportation. Recently he has visited the countries in northern Europe, the Balkans and Near East, presenting illustrated lectures of highway construction, finance and methods of operating motor vehicles. Current decreases in the number of American vehicles sold abroad are due to economic difficulties rather than to dislike of American products.

Mr. Lawrence also found encouragement in the fact that officials of European countries are awaking to the necessity of using gasoline tax receipts and other motor vehicle funds solely for highways instead of general revenue purposes.

Medal Honors World Flight

NEW YORK, July 6—The Aeronautical Chamber of Commerce has commissioned Julio Kilenyi to model a bronze plaque commemorating the record world flight of Wiley Post and Harold Gatty. This is the third time that the chamber has seen fit so to honor heroes of flights. The first to be so honored was Colonel Charles A. Lindbergh, and the second was Rear Admiral Richard E. Byrd.

Studebaker Foreign Business Increases

Canadian Sales and Overseas Shipments Rise in June

SOUTH BEND, IND., July 6—Sales of Studebaker trucks and passenger cars to dealers in Canada for the first six months of this year exceeded the corresponding period in 1930, according to D. R. Grossman, vice-president and general manager of the Studebaker Corp. of Canada, Ltd., Walkerville, Ont. Studebaker business for the half-year period made a gain of 5 per cent.

June shipments of Studebaker and Pierce-Arrow passenger cars and trucks to overseas dealers showed a gain of 16 per cent over June, 1930, it has been announced by Arvid L. Frank, vice-president and general manager of the Studebaker Pierce-Arrow Export Corp. June is the third successive month of the year to show substantial gains over the corresponding months of last year, April exports increasing 9 per cent and May exports 26 per cent, Mr. Frank said.

Stutz DV-32 On Line

INDIANAPOLIS, July 6—The Stutz Motor Car Co. is now in production on its DV-32 line, which is powered with an eight-cylinder engine reaching its maximum horsepower at 3900 r.p.m., and employing dual valves actuated by double overhead camshafts. The line will include a modern version of the Stutz Bearcar, which will be guaranteed to have been driven at a speed of 100 m.p.h. before leaving the factory.

Canada Proposes Aero Cut

WASHINGTON, July 7—A reduction of approximately 45 per cent in Canada's aviation expenditures during the fiscal year ending March 1, 1932, has been proposed by the Dominion Government, according to a report received in the Commerce Department from Commercial Attache Lynn Meekins at Ottawa.

Autocar Gets P.O. Order

WASHINGTON, July 6—The Postoffice Department has awarded an order for 53 motor trucks to the Autocar Co., Ardmore, Pa. This order, which provides for immediate delivery, includes 50 of the Autocar Model NB chassis and three of the Model NBS chassis.

Develops Small Diesel

NEW YORK, July 6—Bromfield Auxiliary Mfg. Co., Boston, Mass., has introduced a small lightweight Diesel generating plant for use as an auxiliary unit on boats and for other indus-

+ + CALENDAR + + OF COMING EVENTS

SHOWS

International Garage Exposition, Berlin, Germany May 9-Aug. 9

CONVENTIONS

Southern Automotive Jobbers, Asheville, N. C. July 20-22

S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio Sept. 1-3

Eastern States Exposition, Springfield, Mass. Sept. 20-26

American Welding Society, Boston, Mass. Sept. 21-25

American Electric Railway Assn., Atlantic City, N. J. Sept. 26-Oct. 2

S.A.E. National Production Meeting, Detroit Oct. 7-8

National Safety Council, Chicago, Ill. Oct. 12-16

Society Industrial Engineers, Pittsburgh, Pa. Oct. 14-16

Transportation Meeting, S.A.E., Washington, D. C. Nov. 10-12

American Roadbuilders Association, Detroit, Mich. Jan. 11-14, 1932

trial purposes. The new engine has achieved simplicity of operation through the elimination of complicated by-pass valves and open nozzles. It utilizes a patent fuel pump supplying the fuel to the cylinder through a flat-seat, needle valve, assuring the correct amount of fuel proportioned to the demand.

The engine is of the horizontal type, totally enclosed, four-cycle, solid injection, pre-combustion, chamber type. This company is also preparing a boat on which there is installed its 42-horsepowered Diesel engine for demonstration purposes.

Electrical Engineers Elect

Charles E. Skinner, assistant director of engineering, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was elected president of the American Institute of Electrical Engineers for the year beginning Aug. 1, 1931, as announced at the annual meeting of the institute held at Asheville, N. C., on June 22, during the annual summer convention of the institute.

Plymouth Builds Specials

DETROIT, July 6—Three thousand special Plymouths finished in flame color with blue lettering and silver striping, are being set aside for use as dealer demonstrators, factory cars and courtesy cars. Seven hundred and eighty of these cars, which will be supplied to dealers, are equipped with a special type of glass of high reflectivity.

American Airplane Names Engineers

Successor to Fairchild Corp. Producing 3 Lines

NEW YORK, July 6—American Airplane and Engine Corp., successors to the Fairchild Aviation Corp., has announced the following appointments to its engineering division: Norman N. Tilley has been placed in charge of engineering; D. J. Lowman in charge of experimental engineering, and W. H. Hagedorn is in charge of pattern, foundry and forgings shop. Mr. Tilley was formerly chief engineer of the Kinner Airplane and Motors Corp., Glendale, Calif. Mr. Lowman was formerly connected with the aero division of Lycoming Mfg. Co., Williamsport, Pa.

The company is at present working on the production of three engines, the Ranger 6-390, the Ranger V-770 direct and the Ranger V-770 geared and supercharged. The last named engine will probably be ready for the market in the fall, according to W. F. Davis, chief engineer.

Surveys Cracking Process

According to the Bureau of Mines, which recently published a survey of cracking plants as of Jan. 1, 1931, the production of gasoline by means of the cracking process has shown a steady increase since such statistics were first compiled (1925). In 1930 the production by this method amounted to 164,243,000 bbl., an increase over 1929 of 20,516,000 bbl., or 14 per cent. As the increase in total motor gasoline production in 1930 was only 0.5 per cent, the relative proportion of cracked gasoline rose from 33.0 per cent in 1929 to 37.7 per cent in 1930. In December, 1930, the ratio of cracked gasoline to the total reached 41.1 per cent, the first month that it had exceeded 40 per cent.

New Brazilian Tariff Up

WASHINGTON, July 9—Completely changing its present system by creating facilities for international reciprocal conventions, the Brazilian government has published a proposed new tariff law, says a cablegram from Commercial Attache Carlton Jackson, Rio de Janeiro. The commission appointed to study rates is to report before the end of the year.

U.S. Tire Business Gains

DETROIT, July 6—The tire business of the United States Rubber Co. for the first five months of this year showed a large increase over the business of the same period a year ago, according to L. M. Simpson, general sales manager of the tire department.

a complete line of
FULLER
TRANSMISSIONS
in all capacities...
for all types of trucks

INDUSTRY and commerce on wheels . . . moving ever-increasing tonnage over streets and highways . . . has developed the manufacture of transmissions into a highly specialized industry in itself.

Over a period of 29 years of specialization in this field, FULLER has achieved recognition as one of the foremost builders of a complete line of heavy duty transmissions.

Load and road conditions; truck design and operating requirements; economies of purchase and maintenance; responsibility of manufacture and responsibility to truck manufacturers . . . all of these factors have been considered in their broadest as well as in their most specific aspects.

Fuller heavy duty transmissions have been developed, in standard models, in a full range of capacities, for all types of trucks . . . short and long wheel-base; for acute angle and obtuse angle propeller shaft connection; for unit power plant and auxiliary installation . . . in 3, 4, 5, 8 and 12 speeds.

Fuller engineers will welcome an opportunity to help you work out your particular transmission problem. We invite an exchange of specifications.

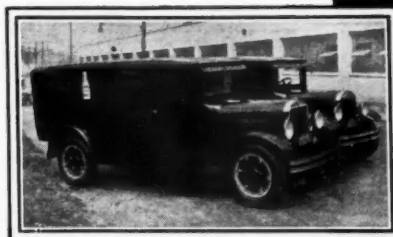
FULLER & SONS MANUFACTURING CO.

Division Unit Corporation of America
 BANKERS' BLDG., MILWAUKEE, WIS.

FULLER
 STANDARD AND SPECIAL
TRANSMISSIONS
"from rough billet to finished product"



Automotive Industries



La France Republic (Model A-1)
 1 Ton Truck equipped with
 Model "WO" Fuller Transmission



Stewart (Model 29XS) 2 Ton
 Truck equipped with Model
 "MKU" Fuller Transmission



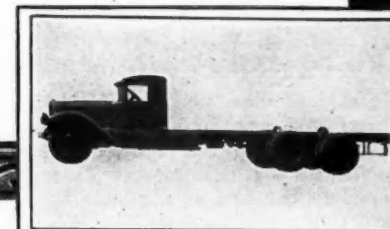
Hug (Model 23) 2 1/2 Ton Truck
 equipped with Model "MLU"
 Fuller Transmission



Le Blond Schacht (Model 30) 3-4
 Ton Truck equipped with Model
 "MGU" Fuller Transmission



Model 60D.C. Relay Dump Truck,
 equipped with Model "VU"
 Fuller Transmission



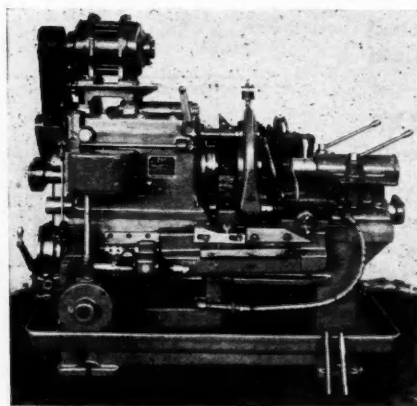
The new Model FDS Sterling
 10-12 Ton six-wheeler, equipped
 with Model "MHU" unit trans-
 mission and Model "AY" Fuller
 Auxiliary Transmission

July 11, 1931

PARTS, ACCESSORIES AND PRODUCTION TOOLS

J & L Fay 12-in. Automatic Lathe

A LINE of four 12 in. Fay automatic lathes has been added by the Jones & Lamson Machine Co., Springfield, Vt. The illustration shows the 12 x 33 machine with center drive, tooled for turning, facing, and necking both ends of a transmission shaft in one setting. The new lathe is a high production machine that can be operated economically on continuous production or for small lot manufacturing where several sizes and types of parts are required to make up a machine load. It can easily be set up for different work. Universal camming, standard tool blocks, wide range of speeds and feeds, and multiple tooling possibilities, makes it a machine that will cover varied types of work supported between centers or held in a chuck or fixture.



The machine has nine feeds through five sets of change gears. The drive is through change gears and a feed shaft. The carriage or turning feeds are .008, .011, .014, .019, .023, .027, .038, .048 and .062 per spindle revolution. The back arm or facing feeds are .008, .010, .012, .017, .021, .024, .034, .043 and .056 per spindle revolution. It has eight standard spindle speeds through four sets of change gears. With the main drive pulley running 1000 r.p.m. the following speeds can be obtained: 56, 72, 98, 130, 162, 215, 290 and 377.

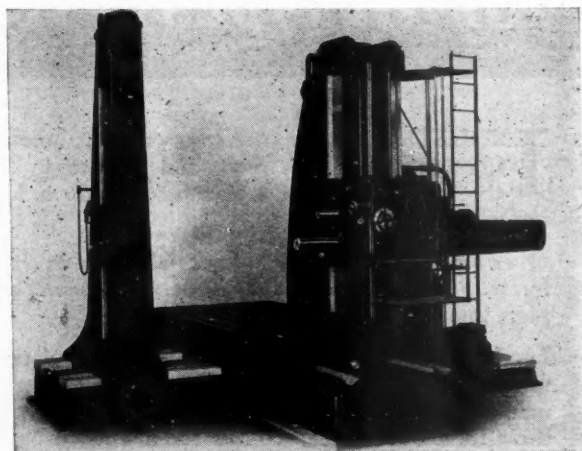
Four different lengths of bed are available: 15 in., 21 in., 33 in. and 45 in. between centers. It swings 13 1/4 in. over the center bar and 19 1/2 in. over the carriage.

Motor drive is of constant speed type 5 to 20 hp., depending upon requirements. Floor space varies from 36 x 72 in. to 36 x 106 in.; net weight from 4800 to 6532 lb.

Horizontal Boring, Drilling and Milling Machines

TWO spindles, the conventional main spindle and an auxiliary high-speed spindle, are among the features of the No. 70 high power precision Horizontal Boring, Drilling and Milling Machine recently added to the line of the Giddings & Lewis Machine Tool Company, Fond du Lac, Wis. The main spindle, 7 in. in diameter, gives 36 speeds in fine geometrical progression within the customary range for a ma-

chine of its size. The auxiliary high-speed spindle, 4 in. in diameter and mounted within the back gear shaft of the main spindle, gives an additional 36 speeds of a range of four times that of the main spindle. These two spindles give a combined speed range of from 3 to 720 r.p.m. Smooth, quiet precision running spindles at these speeds are assured by herringbone gears and preloaded combination radial and thrust ball bearings. Eighteen feeds to either spindle are obtainable through a feed unit built on to one of the front cover plates of the head.



A wide selection is offered in the size and travel of the different units. Vertical adjustment of head on column up to 144 in. on all types of machines. The maximum distance between spindle nose and end support on the table type machine can be made as long as required with tables up to 72 in. x 144 in. On the planer type machine practically any size table required can be furnished with this machine. On the floor type machine the travel of the column on runway, width and length of floor plate can be made to suit requirements.

Peerless Chamfering Machine

CITY MACHINE & TOOL WORKS, Dayton, Ohio, announce a universal type of the Model No. 3 Peerless Chamfering Machine. This machine should particularly appeal where it is necessary to chamfer odd lots of gears. Instead of installing different cams for each pitch of gear, simply shift the cam lever to the proper position. This is accomplished by originally loading four or five cams of different pitch on a sliding shaft in the machine, to effect this operation. The worm and idler gear are unaffected by pitch changes and the principal variable is a driving gear, which varies with the number of teeth in the chamfered part. That is, each gear to be chamfered must be driven by a gear of an equal number, or double the number of teeth in the chamfered gear. This is accomplished by the use of both the single and double thread quick change worm and so necessitates only approximately half the usual number of drive gears. On small lots, it will quite often be possible to simply use as a driving gear one of the gears to be chamfered, and so avoid any additional expense whatever in this connection.

There is a definite border line of Safety

beyond which you cannot allow the cumulative errors in gears to go or the tooth surfaces will disintegrate under _____

IMPACT LOAD

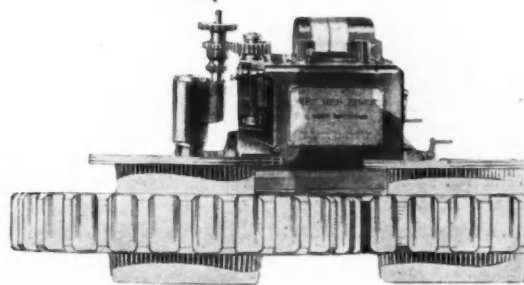
High Speed Gears MUST Be Accurate, not to reduce noise (although accuracy is conducive to quiet operation), but vitally from the standpoint of durability. Such gears, heavily loaded, wear out long before the teeth break out.

Wear becomes excessive (granting the use of proper materials, mounting and lubrication) when augmented by inaccuracies. And not so much by errors in the individual teeth as cumulative errors which, at high speeds, build up IMPACT LOADS many times greater than the applied load. Tooth surfaces disintegrate and the gears wear out long before they break.

There is no assurance that gears will be durable simply because you know there are no excessive errors in the individual teeth.

The safety limit of cumulative errors, determined by speed, pitch of tooth and material is of vital importance. Knowing this limit, the "RED LINER" will tell you at a glance just when your gears are reaching the border line of safety.

THE "RED LINER" functions as an insurance protection of your reputation as a manufacturer of DURABLE GEARS. Now is the time to investigate! Write for booklet No. 11—or, have one of our engineers call and explain this 20th Century gear inspection machine. THE FELLOWS GEAR SHAPER COMPANY, Springfield, Vermont, U. S. A. (or Detroit Office, 616 Fisher Building).



FELLOWS
~ GEAR SHAPERS ~
AND "RED LINER" INSPECTION

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

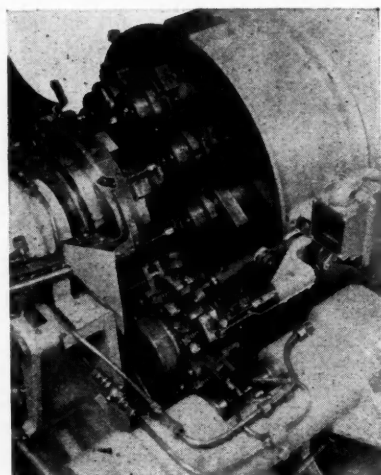
Automatic Continuous Drilling Machine

ESTIMATED production, drilling cotter pin holes, of 145 pieces per minute on push rods; and 60 pieces per minute drilled and countersunk, on clevis pins, steering rod balls, and connecting rod bolts, feature the new continuous drilling machine recently placed on the market by the Fitchburg Grinding Machine Corp., Fitchburg, Mass.

This machine was designed for the continuous drilling of small holes automatically. The work is hopper-fed to a magazine which leads the pieces to the

automatic clamping fixtures. The holes are drilled and countersunk, if necessary, and then ejected. It is essential only to keep the hopper filled and the drills ground.

Eight ball bearing drill spindles are set horizontally in the rotating drum which is driven by a worm and gear. Around this drum is a



stationary ring cam, which feeds in the drill spindles as the drum rotates. The spindles are driven by a center gear rotating on the main driveshaft and engaging with pinions on the spindle shafts. The drill speeds can be changed by pick-off gears at the end of the machine.

A countersinking attachment placed in front of the unloading turret countersinks both ends of a hole by means of two opposed spindles operated by levers at each indexing of the turret. The attachment is adjustable to and from the turret for different lengths of work. The throw of the countersinking spindles can be adjusted for varying diameters of work.

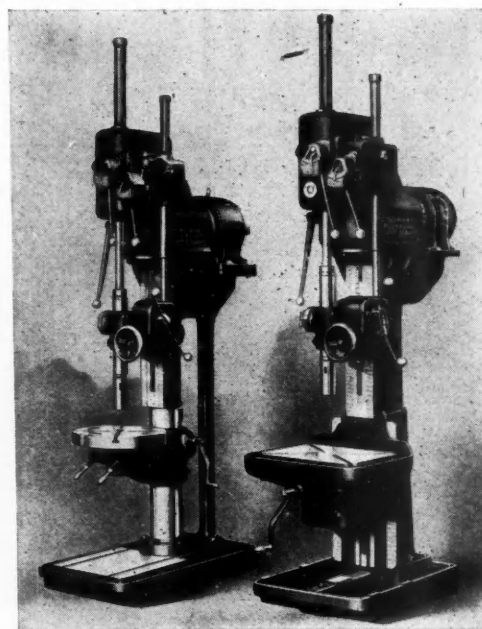
Maximum capacity: $\frac{5}{8}$ -in. diameter, $\frac{1}{4}$ -in. drill, $\frac{5}{8}$ -in. length of hole. Three driving motors of 5 hp. capacity each. One $\frac{1}{4}$ -hp. motor for countersinking, and one $\frac{1}{4}$ -hp. motor for the coolant pump drive.

Upright Drilling Machines

NEW 21-in. and 24-in. super-service upright drilling machines of advanced design have been announced by the Cincinnati Bickford Tool Co., Cincinnati, Ohio. These machines are built in either round or box column construction as illustrated, and may be equipped for general purpose or single purpose work. The standard machine has 12 spindle speeds, obtained through selective sliding gears and controlled by a single lever. Ball and roller bearing

construction is featured and all mechanism is automatically flooded with oil. Direct reading plates indicate the speeds and also indicate nine rates of feed, which also are controlled by a single convenient lever.

The sliding head is accurately counterbalanced and is fully enclosed. The drop worm type of feed en-



agement has been replaced by a constant mesh worm, dipping in oil. The feed is engaged by either of the two pilot levers which control the advance and return of the spindle. A sidewise movement of either of these levers engages a positive type feed clutch. An adjustable feed trip may be set to disengage the feed at the required depth. Safety trips automatically disengage the feed at the top and bottom limits of travel.

Super-Service Uprights are to be had as single units, or combined into gang drills of either the high base or low base type.

The driving motor of 3 or 5 hp. capacity is direct connected and its close coupled mounting locates it out of the operator's way and in a position where chips and dirt cannot cause damage.

Dustless Take-About Sander

PORTER-CABLE-HUTCHINSON CORP., originators of the hand belt type of sanding machine, has recently brought out a new model known as the Type B-10 Dustless Take-About Sander, differing radically in design from their other Types B-5, B-4 and B-44. Heretofore there has been no means of controlling the dust in this type of sander, which has somewhat retarded its use. The B-10 has done away with this objection, as a dust removal system has been built into the machine. A double blade fan traveling at 10,000 r.p.m. creates a powerful vacuum which draws the dust through ports directly in back of the rear pulley and deposits the dust in the bag. Motor is of the universal type, developing a trifle over 1 hp. This power is transmitted to the rear drive pulley through a hardened and ground worm thread and nickel bronze worm gear and spiral gears. The construction is simple. This machine is also equipped with a new type of sanding shoe over which the belt passes. It is covered with cork and tempered steel .010 in. in thickness.